Chapter 9
Natural Resources

INTRODUCTION

A city, by definition, is a place where urban development occurs. Such development substitutes a man-made environment for the natural environment. While some changes are inevitable, with appropriate consideration, the negative impacts of people on the natural environment can be reduced. Conserving and incorporating the natural environment into the urban environment permits the enjoyment of nature thereby increasing the quality of life enjoyed by community residents. Protection of such natural resources as air and water quality are also important to the health of residents and employees, both current and future.

This chapter describes the natural resources in the City of Fremont and the City's plans for conserving them. The following resources are considered:

Biological
Mineral
Soil
Water
Energy
Air
Scenic and Visual

Each subsection of the chapter is divided into two parts:

- **Setting:** a description of the current conditions related to the natural resource;
- **Projections:** expectations regarding future conditions related to the resource; finally,

At the end of the Chapter, the goals, objectives, policies and implementation measures to conserve the City's natural resources are presented.

BIOLOGICAL RESOURCES

Biological resources are the living elements of the City's environment including all plants and animals. This section focuses on the non-human biological environment, and especially on the "natural" environment — those areas of the landscape not fully managed as part of developed areas.

Setting

Fremont has four distinct physical areas: baylands, lowlands, flatlands and hills (Figure 9-1). Each of these physical zones can be further subdivided into ecological or "Habitat Zones" (Figure 9-2). Within these zones are unique biological resources that do not fit into any broad definitions of the area's characteristics. These biological resources are identified on Figure 9-3.

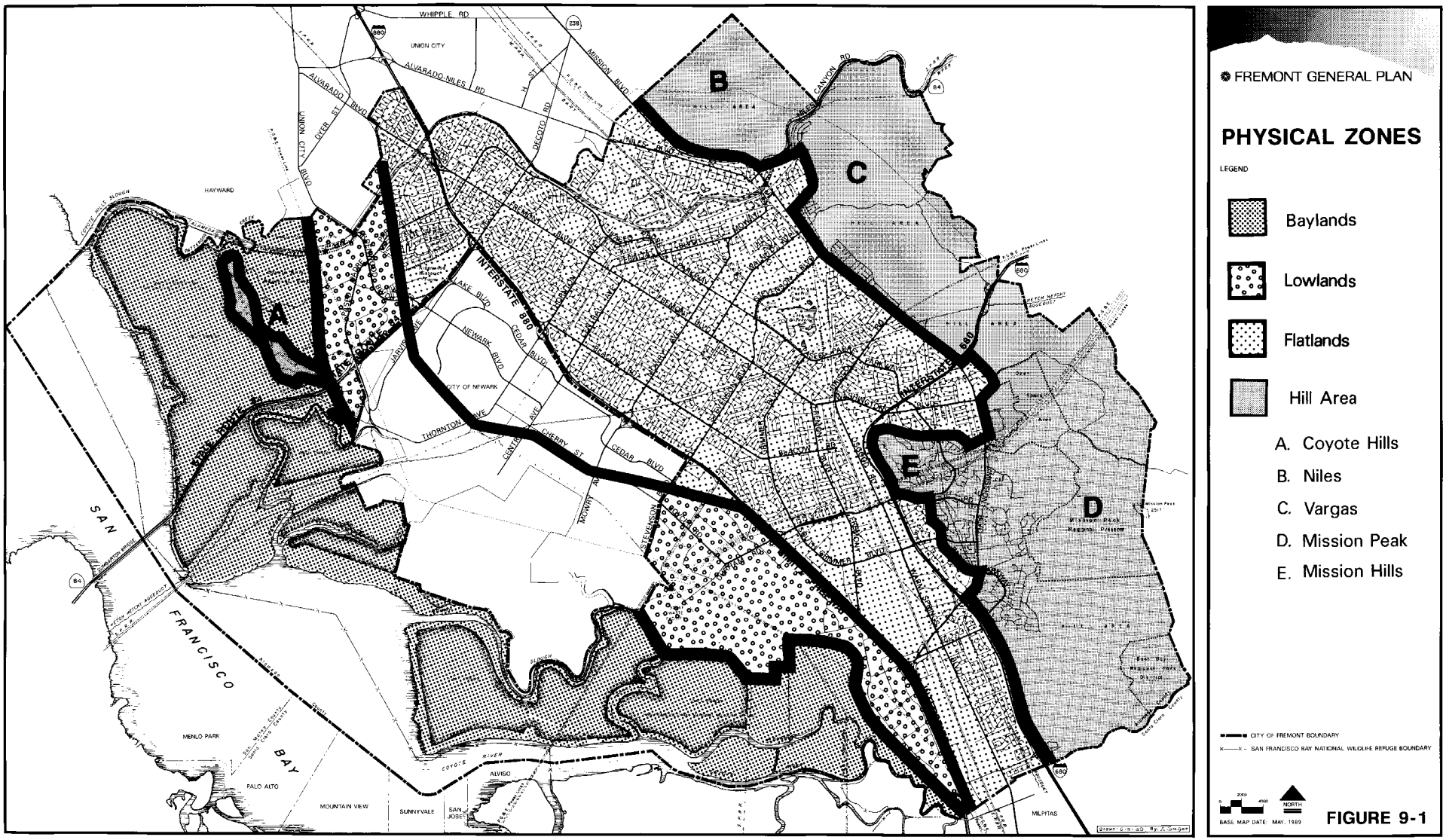
While each ecological zone has been significantly altered by urban development, each still includes some of its original habitat characteristics and each supports a diversity of plant and animal species.

Some of the plants and animals found in Fremont are classified as endangered or threatened or candidates for listing by the Federal and/or State government. Endangered species are defined as those plant and animal species seriously in danger of becoming extinct. Threatened species are those likely to become endangered in the foreseeable future unless protective actions are taken. Candidate species are those which may face extinction but for which additional information is still needed for a final determination.

Each of the three physical zones is described below, with additional information presented in the Biological Resources Background Report to the Fremont General Plan.

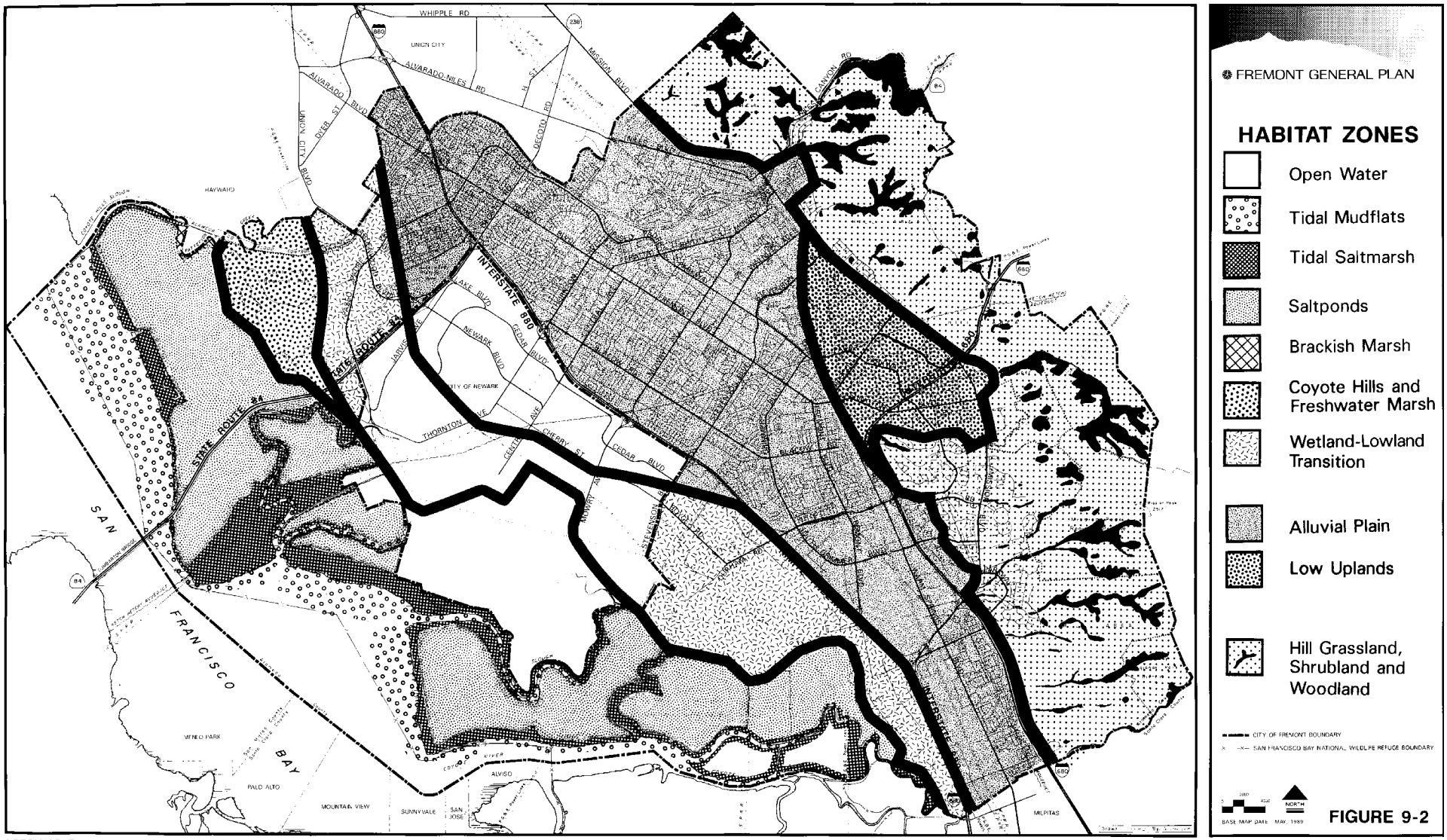
Baylands

Fremont's baylands are an internationally important natural resource due to their importance in supporting birds migrating along the "Pacific Flyway," a migratory route encompassing the entire Pacific region of the Northern Hemisphere. The baylands are also the home of several endangered species, including the California Least Tern, Salt Marsh Harvest Mouse and California Clapper Rail.



ACFCWCD Revegetation Manual, Harvey and Stanley, 1983
Hill Areas, COF, Res. 2302, 1969

Figure 9-1 Physical Zones



ACFCWCD Revegetation Manual, Harvey and Stanley, 1983
USFWS, National Wetland Inventory, 1985
Hill Areas, COF, Res. 2302, 1969

Figure 9-2 Habitat Zones
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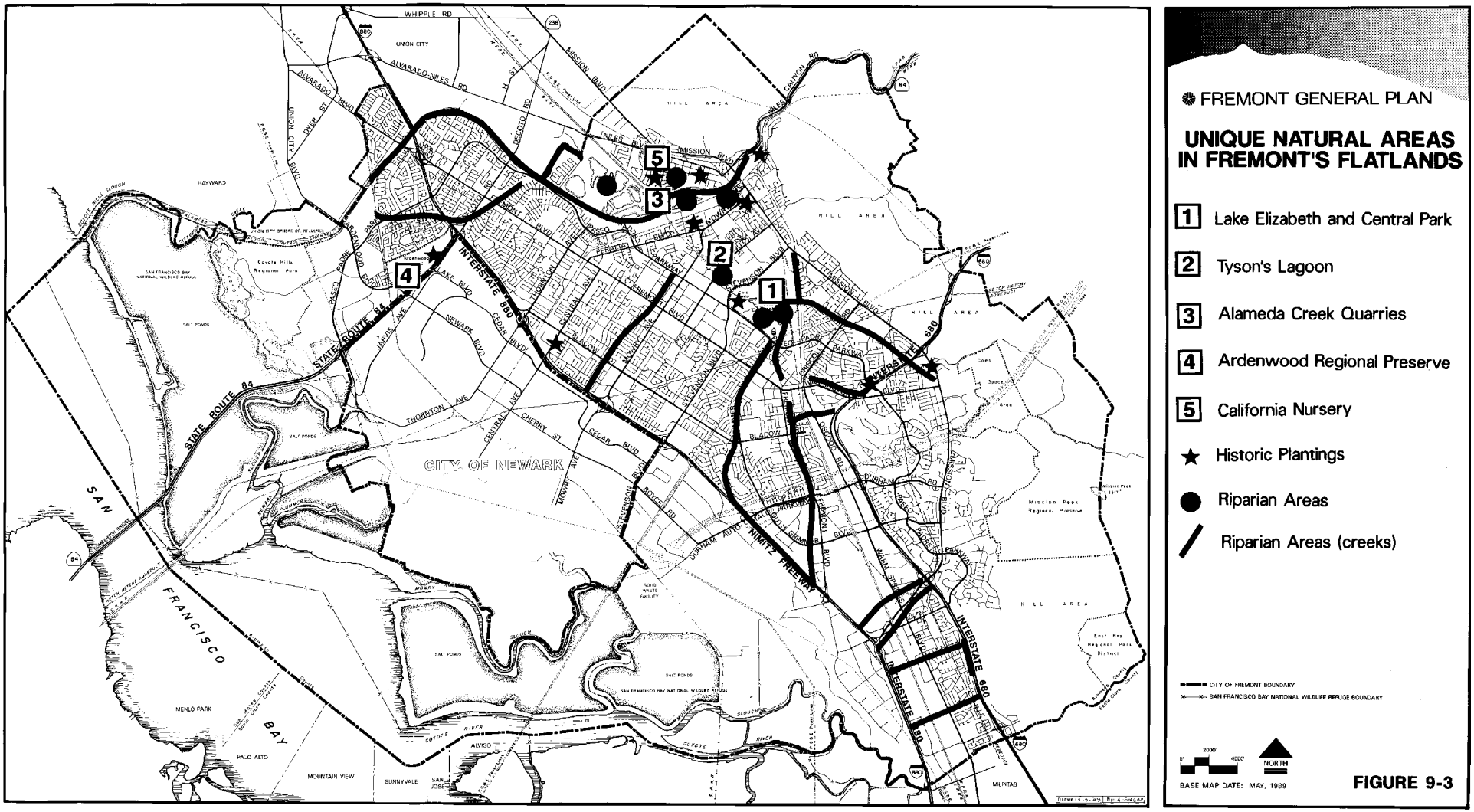

Figure 9-3 Unique Natural Areas in Fremont's Flatlands
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Within the baylands are six distinct habitats: 1) Open water and sloughs, 2) tidal mudflats, 3) tidal wetlands, 4) saltponds, 5) brackish marsh and 6) Coyote Hills and freshwater marsh (Figures 9-3). The vast majority of Fremont's baylands are incorporated in the San Francisco Bay National Wildlife Refuge, which includes over 18,600 acres in the South Bay, approximately half of which are in Fremont. Another 24,000 acres have been identified for incorporation into the Refuge throughout the south Bay (2,300 acres in Fremont), as funding permits. The Coyote Hills and freshwater marshes are within the Coyote Hills Regional Park.

Open Water

Fremont's city boundaries extend into San Francisco Bay. The Bay is habitat for 70 to 100 species of fish as well as a variety of shellfish, shrimp, crabs, and other marine life. Birds such as loons, grebes and cormorants feed in the South Bay's open waters. The waters of Mowry Slough support a harbor seal nursery. The open waters found in the mouth of the Alameda Creek Flood Control Channel attract steelhead (sea-run trout) to move upstream to attempt spawning.

Tidal Mudflats

Mudflats provide important feeding grounds for shore birds. Tidal mudflats are inhabited by a large number of algae and microscopic plants, as well as over 100 species of invertebrates. A number of mollusks such as mussels, clams and snails are also common and are critical sources of food for a diversity of bird species.

Tidal Wetlands (Salt Marshes)

Salt marshes are one of the most productive of natural communities. They usually occur at elevations slightly higher than tidal flats. Through tidal action, vast quantities of nutrients from marshlands are passed to the mudflats to support Bay plants, fish and wildlife. In the city, most of the salt marsh is dominated by a solid, dense groundcover of pickleweed and cordgrass.

The marsh vegetation provides feeding and nesting areas for waterbirds. The endangered clapper rail is dependent upon salt marsh habitat for survival. The salt marshes of Fremont also support the endangered salt marsh harvest mouse. Salt marsh species persist in wetland transition areas where diking or other site modifications may have occurred.

Salt Ponds

Around South San Francisco Bay, diked lowlands have been used as evaporation ponds for salt extraction. These ponds are used by many species of birds for feeding. Nesting by threatened species such as the

least terns occur on the levees and earth islets. Certain fish may also inhabit salt ponds when they are at relatively low salinity levels. Salt ponds have lowered habitat values as salinity levels rise during the salt extraction cycle.

Brackish Marsh

Saltmarsh areas receiving freshwater take on brackish marsh characteristics. The salt component may be derived from tidal or soil sources. The endangered salt marsh harvest mouse and California Clapper Rail are found in brackish marsh habitat areas. Nearby uplands and riparian areas provide connections to upstream habitats. Some of the lower four miles of the Alameda Creek Flood Control Channel (Coyote Hills Slough) is brackish marsh influenced by estuarine waters of San Francisco Bay.

Coyote Hills and Freshwater Marsh

These arid grassy hills function as a barrier to bay winds and salt water and provide the setting for the only major freshwater marsh in the South Bay as well as vernal pools. This area is entirely within Coyote Hills Regional Park. Opportunity for creating freshwater marsh exists with future quarry reclamation adjacent to Coyote Hills. Endangered species typically found in this type of habitat include the California Least Tern and California Clapper Rail. These areas are also habitat for several species considered threatened.

Wetland Lowlands

The lowlands are a transition zone between the wetlands near the Bay and the flatland areas. Much of this area is underlaid by bay mud and includes saline or alkaline soils or poorly drained clay and clay loam soils. Included in this transition zone are seasonal wetlands, vernal pools, salt pannes, freshwater and brackish marshes, slough headwaters and adjacent uplands.

This area is a single habitat zone with characteristics of both the baylands and flatlands. These lands are used for agriculture and have been used for duck clubs in the past. The Sanitary Landfill is considered to be within this habitat zone. Endangered species associated with this type of zone include the California Least Tern, Salt Marsh Harvest Mouse and the California Clapper Rail. Most of this area is developed or planned for industrial development. Areas planned for development will not consume habitat for the endangered species.

Flatlands

The alluvial flatlands of the Bay Plain of Fremont lie between the hills on the eastern side of the City and the baylands on the west. This is where most urban development in Fremont occurs; little of this area remains in its natural state.

The low upland terraces east of Central Park, around the Mission Hills and the base of the eastern Hill Area support a variety of habitats in the riparian corridors. Outside of some unique natural areas there are primarily two types of habitat areas: landscaped and grassland areas. These are described below.

Landscaped Areas

Landscaped areas include private gardens, corporate landscapes, parks, street landscaping and other public agency open spaces. These landscaped areas and the types of habitat they support are a significant departure from the grassland and fields that existed in Fremont prior to urban development.

The man-made landscape extends the habitat diversity found in the unique natural areas in the city and can be viewed as an extension of those habitats. This habitat supports mammals such as squirrels, raccoons, opossums, and over a hundred bird species, as well as lizards, snakes, insects and over thirty butterfly species. Domestic and feral (wild) cats and dogs are consumers of small mammals, birds, frogs, lizards and snakes.

Grassland and Fields

Annual grasses and plants such as flowering mustard are common in fallow areas within the City. In addition to non-cultivated grasslands, there are several remnant agricultural areas on prime farmland. Agricultural crops recently grown in Fremont include apples, corn, cauliflower, lettuce and gladioli. Many wildlife species are associated with these areas including ground squirrels, jackrabbits, snakes, lizards, and a variety of insects. Hunting birds (raptors) use these open grassy areas to search for prey.

The creeks in the flatlands are typically channeled and support vegetation subject to weed control. These flood control right of ways function as mini wildlife corridors, typically supporting snakes, lizards, small mammals, spiders and insects.

Unique Natural Areas in Fremont's Flatlands

There are several unique natural areas in Fremont's flatlands, almost all of which are in public ownership (Figure 9-3). All are semi-natural areas altered for flood control, mineral extraction, aquifer recharge or other purposes. These include the following:

Lake Elizabeth and Central Park. Lake Elizabeth is a major lake habitat. It supports bottom fish such as bass and catfish, a resident population of ducks and geese and a large migratory bird population including pelicans. The lake supports some recreational fishing. Much of the lake's shoreline is lined with riprap and has little or no vegetation; however, the eastern shore and island is vegetated with a variety of common freshwater plants. This shoreline marsh and island provides roosting and foraging habitat for coots, egrets and blackbirds.

The fallow fields on the margins of the developed parkland provide habitat for the burrowing owl, identified as a "species of special concern" by the California Department of Fish and Game. The owl uses ground squirrel burrows, which are vulnerable to tillage.

The twenty-acre freshwater marsh and riparian woodland adjacent to the Lake provides a rich habitat for 60 - 100 species of birds and common urban wildlife such as skunk, opossum, raccoon and rabbits.

The lake functions as a major component of Fremont's flood control system and is subject to loss of water quality from excess nutrients concentrated in stormwater and the stagnant nature of its water retention function. The adjacent marsh receives drainage from Mission Peak and is prone to siltation and to loss of habitat values due to algae growth and a resultant loss of oxygen in the water.

Tyson's Lagoon. Tyson's Lagoon, originally a single freshwater marsh, is a wetlands and pond area located adjacent to the Fremont BART station and divided by Walnut Avenue. These tule ponds are owned and managed by the Alameda County Flood Control and Water Conservation District (ACFCWCD) as water retention ponds for flood control purposes. These ponds support a wide variety of waterfowl and other plant and animal species in the open pond, shrub and woodland habitats.

Alameda Creek Quarries and Niles Community Park. The Alameda Creek Quarries are an especially varied habitat. Almost all of the quarries are jointly owned by the Alameda County Water District and the East Bay Regional Park District. The quarries are critical groundwater recharge facilities (see Water Resources section of this Chapter) as well as important wildlife habitat.

The quarries include several types of vegetation areas, including riparian woodland, freshwater marsh, grassland, brushland and areas of introduced species from old homesites. Several animal species classified as threatened are found here. Many migratory birds including both wildfowl and smaller birds use this habitat.

Ardenwood Regional Preserve. Major habitat components are the landscaped areas, row-crops, old orchards and 34 acres of eucalyptus species. Native riparian species are also scattered on the site. Animals include blacktail deer, gray fox, fox squirrel, common snakes and toads, small migratory birds, hawks and turkey vultures. The eucalyptuses provide a suitable environment for Monarch Butterflies and perching sites necessary for raptors and vultures. Open fields and marshlands provide their main hunting range.

There are no known endangered species on the site. Landmark trees on the site include several Eucalyptus species, Dawn Redwood, and other historic plantings.

California Nursery. This major urban forest contains over a hundred specimen trees as well as dozens of unique landmark trees. This area provides important roosting and nesting habitat for large birds.

Other Historic Plantings. The City has established criteria for trees to be considered "Landmark Trees." Among those criteria are size, age and historical significance. Concentrations of identified Landmark Trees are found in the subdivisions around the California Nursery, Shinn Park, and Patterson House in Ardenwood. Landmark Palms and olive trees are found in Mission San Jose and in the several old cemeteries. These are valuable components of the City's historic landscape.

Riparian Areas. Riparian areas are a watercourse (either perennial or intermittent), lake, pond or other wetlands and the associated vegetation. Alameda Creek Flood Control Channel is a significant wetland habitat. Other creek zones include portions of Mission Creek.

Hills

The hills of Fremont rise from the Bay Plain in the east of the City. The hills support three major habitat areas: grasslands, shrubland, and woodland. The shrub and woodland communities are typically found on slopes with northern aspects and in canyons. Each is briefly described below.

Grassland

Grasslands consist of annual grasses and forbs, with occasional shrubs such as Coyote brush and poison oak. Most of these annual grasses were

introduced after European settlement; native bunchgrasses have been overgrazed and are no longer dominant.

Grassland offers little in the way of roosting or nesting habitat for wildlife, but provides foraging and hunting ground for a large number of bird species. Grasslands are also an important grazing resource for cattle (see Soil and Agricultural Resources section) and deer. Burrowing rodents, several snake species and ground-nesting birds are also found in the grasslands areas. The Alameda whip snake, a species listed as threatened by the State of California, is typically found in hilly grassland areas in Alameda County.

Shrubland

Compared with grasslands, the shrubbed portions of the hill area are less common and are valuable for the cover and forage they provide small animals in the vicinity of creeks in swales and canyons. Several bird species frequent shrub-dominated areas, and several animals are associated with this habitat, including the jackrabbit, pinion mouse, spotted skunk, snakes, lizards and tarantula.

Woodland

Wooded areas are widely scattered throughout the hills, characterized by relatively moist, sheltered and shaded habitats. These include riparian woodlands associated with stream bottomlands such as Niles and Morrison Canyons, and along Mill Creek, Mission Creek, and various other canyons in the hills. There are two stands of Bluegum eucalyptus in the Hill Area (on Vargas and Stanford Roads) and a mix of redwoods and eucalyptus in the Kimber subdivision.

Woodlands can be characterized by three types: 1) oak woodland; 2) broadleaf evergreen forest, and 3) riparian woodland. In most cases, these zones intergrade with each other. Scattered oaks are also found in grassland areas. A wide variety of wildlife use these woodland areas, including several species of mammals, reptiles and birds.

Projections

Baylands

The Wildlife Refuge has incorporated, or expects to incorporate almost all of the baylands wetland habitat as well as some parcels in the lowland area. However, funds for Refuge expansion are being made available by the Federal Government in relatively small increments. At expected levels of disbursement, funds to purchase all identified sites would not be available for twenty years or longer. In the interim, development could proceed on some sites identified for potential acquisition,

Wetland Lowlands

Most of the lowland area is planned for industrial or other development. Some lowland areas adjacent to wetlands are proposed for incorporation in the Wildlife Refuge. However, as noted above, it could be several years before sufficient funding is available to purchase identified sites. In the interim, development could proceed on some identified sites identified for purchase. Appropriate mitigations will be needed to minimize the impact of development on adjacent wetlands. In addition, some lowland areas have seasonal wetlands and vernal pools. Preservation or mitigation of wetland impacts will be necessary.

Flatlands

Over time, the amount of undeveloped area within Fremont — landscaped, grasslands and fields — will diminish. The importance of open areas within the City to protect biological resources will increase as the City becomes more densely developed. Land that is not today managed for its biological resource values (such as drainage ditches, flood control ponds and open meadows) could be managed for this purpose in the future, thereby protecting the City's biological heritage and its connections to its natural environment.

Pressure for other use of publicly owned natural areas is also likely to increase due to increased recreational demand and pressure to utilize available open space for more active uses. Increased use and modification of natural areas would reduce their habitat value.

The proposed BART extension is expected to have significant impacts on the marsh area on the south side of Walnut Avenue. While BART and the Flood Control District (which owns these drainage areas) have previously preserved the flood control purposes of these marsh areas, additional effort should also be extended to preserving habitat values in the future.

Similarly, the need to protect the biological values of the Alameda Creek Quarries should be an important consideration in the design of the proposed recreation area.

Hills

The Mission Hills are largely developed, with a few remaining semi-natural riparian corridors that have been preserved, as well as some grassland and woodland habitat areas. Limited additional development is likely to continue in this area leading to some additional loss of primarily grassland habitat.

The Hill Face of Fremont is protected by the Hill Area initiatives from development that would have a significant impact on its habitat values. The golf course proposed for an area at the base of Mission Peak should be developed in a manner sensitive to the habitats and general character of the hills.

Mission Hills West. Although this area is largely built out, much of the sloped land is included in dedicated open space, including the partially completed Antelope Hills Trail. The open areas include non-native grassland and live oaks, buckeyes, toyon, poison oak and coyote brush in the north canyon area. Some additional low-density residential development, and a small office and neighborhood commercial area is permitted on the boundary of this area.

MINERAL RESOURCES

This section of the Natural Resources Chapter discusses mineral deposits in Fremont. The major mineral resources found in Fremont are sand and gravel, stone, salt, mineral water and related resources. All identified mineral resources in Fremont are common; there are no significant amounts of "rare" or "valuable" minerals such as gold, silver or mercury.

Common mineral resources have importance to the City and to the region because many are vital to the economic activity of the Bay Area. Adequate supplies of some types of mineral resources at a reasonable cost support existing and future development. The importance of mineral resources must therefore be considered in relation to their market area as a whole as well as their importance to the City of Fremont.

The availability of some mineral commodities in urban areas is endangered by competing or incompatible land-uses. Land use decisions about mineral resource sectors must balance mineral resource values with other resource values such as protection of water resources, provision of land for jobs and housing and the protection of aesthetic or visual resources.

Setting

Construction Aggregate (Sand, Gravel, and Crushed Rock)

Construction activity in the state and Bay Area has made production of gravel from crushed and broken stone one of the oldest and most extensive mineral-related industries in California. The cost of transporting sand and gravel contributes to the importance of having sources close to markets. The primary source of construction aggregate in the Fremont region is Alameda Creek and its tributaries. The State estimates that reserves within this region will be depleted by 1999, after which aggregate will have to be imported from other regions.

Extraction activities in Fremont take place at three quarries. The permits for two quarries expire in 1990 and additional extraction activity is not expected. The third quarry (Dumbarton) is expected to complete its operations by 1997. Only this last quarry is within the special state mandated sectors discussed below.

The State's Mining Act was intended to implement two State policies related to quarrying mineral resources:

1. Operations are conducted to minimize adverse environmental impacts and result in a usable, safe landform when quarrying has ceased.

2. Production and conservation of existing and future supply of mineral resources while giving consideration to values related to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment.

The State reviews local policies for quarries to determine whether the local quarrying policies are in conformance with Policy 1. The City's Quarry Overlay District was found to be in conformance with State law.

To implement the second policy, the Mining Act provides for a mineral lands inventory process. The State has designated six areas within Fremont as Regionally Significant Construction Aggregate Resource Sectors (Figure 9-4, Mineral Resources).

Each of these State designated areas is discussed below (the identification numbers are those used by the State).

Sector H and Sector I-1, LL-1, LL-2. All of these sectors are located in various parts of the Hill Area of Fremont. Several sectors abut publicly owned parklands and regional preserves.

Sector K-2. This site is located west of I-880 on the southern edge of Fremont and is designated Industrial on the General Plan. Plans for an airport or industrial use of this sector are under consideration. In May 1988, the Army Corps of Engineers determined a significant portion of this area to be seasonal wetlands under Corps jurisdiction. This sector is also adjacent to the San Francisco Bay National Wildlife Refuge.

Sectors L-1, L-2, L-3. These sectors are located in five parcels located between the Nimitz Freeway, Alameda Creek, the Coyote Hills and Highway 84 in the northwestern portion of Fremont. Some of these sectors are in the area commonly known as the Ardenwood Forest New Town and are developed or are under development with residential, commercial, and industrial uses. Part of one sector is in the Ardenwood Regional Preserve, an agricultural park and historic site. The remainder is designated Open Space or agriculture on this General Plan. All five sectors are over the Niles Cone, a complex of aquifers providing a major part of the area's water supply.

Sector M. This sector is an existing quarry known as the Dumbarton Quarry, located on the west side of Fremont.

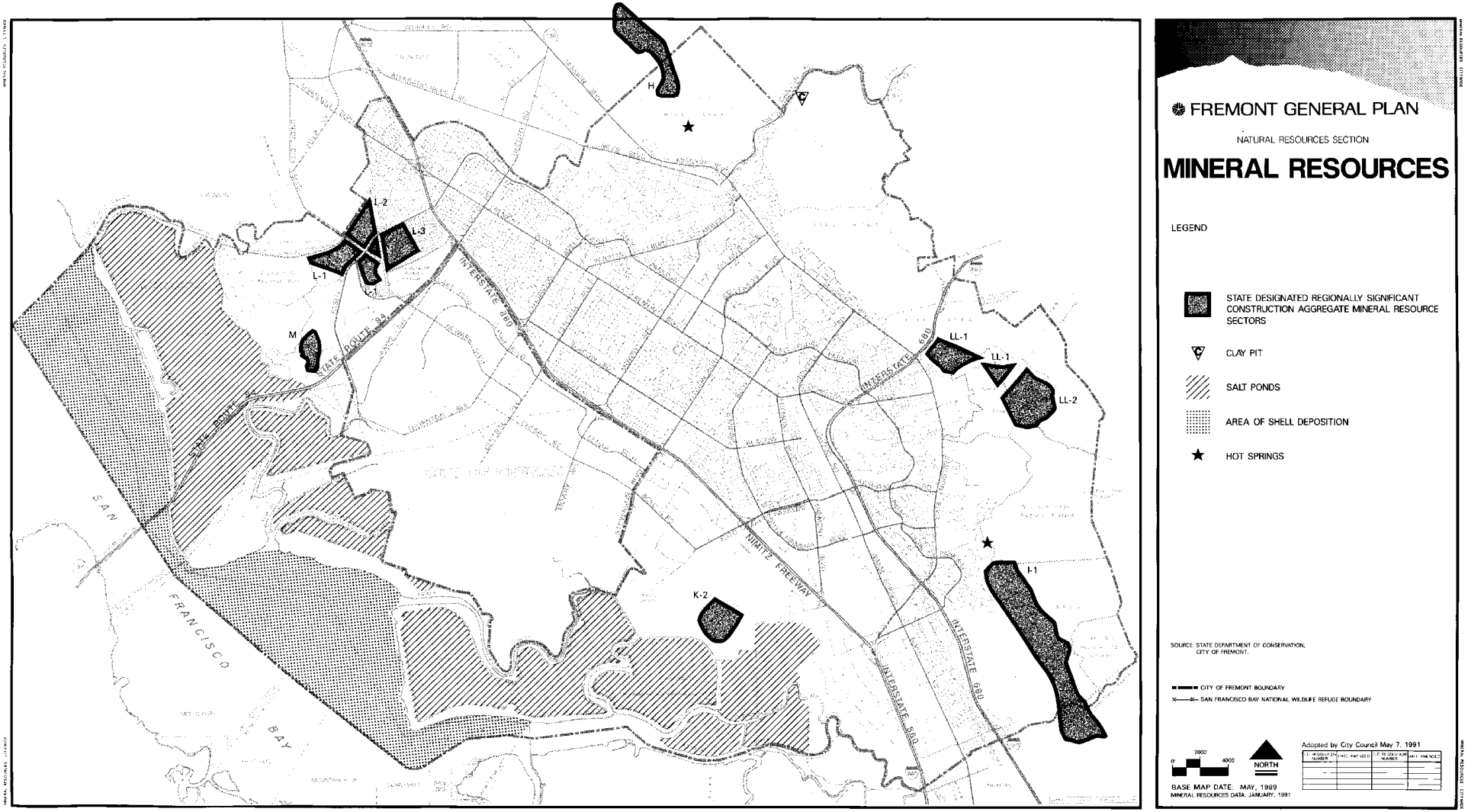

Figure 9-4 Mineral Resources

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Salt

Salt ponds in Fremont and Newark account for 62.5% percent of the Bay Area's annual salt production of about 1.2 million tons per year (1989). Salt concentration ponds cover about 8,800 acres in Fremont.

Theoretically, future salt supplies are virtually unlimited. However, because salt has a relatively high transport cost, loss of sufficient supply near industrial operations could result in higher production costs or cutbacks in operations of businesses dependent on salt. The bulk of California's salt utilizing industry uses salt produced through solar evaporation, most of which is in the Bay Area. This dependence is likely to persist making local salt production a local and regional resource of considerable value.

Salt ponds are also an important wildlife habitat, as discussed in the Biology section of this Chapter. The National Wildlife Refuge, which includes nearly all of Fremont's salt ponds, allows continued production of salt through solar evaporation because the ponds blend well with the overall purpose of the refuge. Salt marshes and tidal flats - which the ponds have replaced in many areas - also provide important habitat for plant and animal life.

Other Mineral Resources

Other mineral resources in Fremont include clay, mineral springs and limestone deposits. Each is briefly discussed below.

Clay. No detailed Statewide information on clay deposits and potential resources is available, although large reserves of miscellaneous clay appear to be present. Fremont has had two sites where clay was traditionally quarried, although only one is currently in operation.

Mineral Springs. Fremont has two mineral springs that have been identified by the U.S.G.S. as having regional significance. One is in a canyon north of the Niles area and the other is at the historic Warm Springs Hotel-Stanford Winery complex in the Warm Springs area. Other hot springs may exist in Fremont along the Hayward fault corridor.

Limestone. The U.S.G.S. has identified large quantities of limestone located within the City limits beneath the Bay itself. Limestone is a critical component of cement production. According to USGS, the entire South Bay floor may be underlain by quaternary seashell deposits (limestone) to a magnitude of possible importance to the entire region. These deposits have been quarried in other portions of the Bay Area but are untouched in Fremont.

Projections

In considering the future management of mineral resources, the value of the resource must be weighed against social, environmental, and economic goals for the City. This General Plan calls for consideration to be given to the mineral resource values of a site in any land use decision requiring review by the Planning Commission or Council. In reviewing a quarry permit application, the City must consider the impacts on the environmental, economic and social goals of the City.

Construction Aggregate

Each of the sites identified by the State inventory is evaluated below in relation to other City policies, potential development and other constraints. These evaluations are not exhaustive but provide context for policy development in regard to the resource. Prior to any additional actions taken on an identified site, additional study and evaluation would be needed. All of the mineral resource sites currently designated Open Space in the General Plan have also a Mineral Resource Overlay designation. As noted above, the City will consider the resource in reviewing proposals for development that would affect the resource.

Sectors H, I-1, LL-1, LL-2. Development in much of the Hill Planning Area of Fremont is guided by citizen-adopted initiatives permitting only very low-density residential uses and strongly limiting the visual and environmental impacts of development. These policies will protect most of the identified mineral sites from significant encroachment by incompatible uses. However, the probable environmental and aesthetic impacts of quarrying would not be consistent with initiative adopted policies regarding protection of the character of the Hill Area (see Land Use Chapter). The impacts of a quarry operation on access roads, on water resources, and on existing park and public facilities would all have to be taken into account prior to permitting any mineral extraction activity.

Sector K-2. This site, west of I-880 in the southern part of Fremont is located in an area identified as potentially having seasonal wetlands. This area has been identified for potential acquisition by the National Wildlife Refuge. Any consideration of its use for mineral extraction would have to be considered in relation to its critical value as potential wildlife habitat and the impacts on adjacent nationally significant habitat areas.

Sectors L-1, L-2, L-3. Development in Ardenwood is guided by a development agreement adopted prior to the designation of the mineral sectors. The incompatible uses that have developed pursuant to that

agreement will preclude future extraction activities in portions of the sectors. A portion of one sector is in the Ardenwood Regional Preserve and is thereby protected from incompatible uses. However, any extraction activities would face severe constraints due to its location in a regional park and historic site. The remainder of the sectors is designated Agriculture on the General Plan. This designation should conserve the resource from incompatible uses in the near term.

Extraction activities in any of these sectors face severe constraints due to the presence of the Niles Cone, the groundwater system providing much of the potable water supply for the Tri-City area (Newark, Union City, Fremont). It is unlikely extraction activities could be conducted that could be guaranteed not to affect this vital water resource.

Sector M. This sector is the existing Dumbarton Quarry, which is expected to be phased out by 1997 as the available aggregate is exhausted.

Salt

There is no indication of any change in the salt industry in Fremont. Due to the importance and value of salt extraction, the City should continue to encourage salt production. However, should salt production cease, the reconversion of salt ponds to salt marsh or other habitat should be considered a high priority.

Other Mineral Resources

Clay. As with other mineral resources found in Fremont, proximity to a large market in the Bay Area is of prime importance. The Bay Area's growth and vitality should continue to provide a ready market and keep this industry viable. However, the environmental impacts of clay extraction, the value of land, and the availability of sources in other locations may lead to the gradual phasing out of this mineral extraction activity in Fremont.

Mineral Springs. Mineral and possible energy values of these resources have not been identified. These resources should be fully evaluated for their mineral and other unique values prior to any significant modification in land uses that could prevent future access and/or use of the resource.

Limestone. Statewide limestone resources are considered sufficient for the long-term. Possible exploitation of Bay limestone resources is highly constrained. The Wildlife Refuge and the protection of water quality would be just two of the many issues requiring further analysis prior to any limestone quarrying being permitted in Fremont.

SOIL AND AGRICULTURAL RESOURCES

Soil is the layer of weathered rock, organic matter and sediment on the surface of the land. The resource value of soils is usually measured in regard to two of its properties: its ability to sustain the loads of urban development and its productivity as an agricultural resource. This section will begin by providing an overview of soils in Fremont, followed by a discussion of those two resource values.

More detail regarding the specific soils found in Fremont, including soils maps and a discussion of each soil type, is found in the Soils and Agricultural Resources Background Report.

Setting

There are four general soil categories in Fremont resulting from the combined influence of topography, parent material, water, humans, vegetation and climate: deep alluvial fan and floodplain soils, poorly drained valley basin soils, saline soils and alkaline valley basin soils. These soil types are further subdivided into different soil classifications. The Soil Conservation Service (SCS) of the U.S. Department of Agriculture is charged with evaluating soils for their characteristics. The following information is based on its analysis.

Agricultural Productivity

Different soils have different capabilities of sustaining agriculture. The chemical nature of the soil (e.g., alkaline or acid), its water holding capacity, the amounts of organic material, its slope and depth are all properties of soil, which contribute to the types of agricultural practices it can support.

Soils are rated by SCS in a classification system from I to VIII based on their potential to support standard agricultural cultivation practices. Class I and II soils are unrestricted in their use for cultivation and are defined by SCS to be “prime soils”. Class III and IV soils require special management practices, while Classes V - VIII are generally unsuited for cultivation. Class VI and VII soils can be suitable for some types of agricultural use, such as rangeland for livestock grazing.

One of the more important elements in the SCS classification system is the degree of slope. The Class I and II soils are found in areas with little or no slope, while other classes are found in areas with increasingly steeper slopes. U.S. Soil Conservation Service soil types are shown on the Soils map in Appendix A of the Natural Resources Background Report.

Prime Agricultural Soils. Most of Fremont's Bay Plain is prime agricultural land composed of Class I and II soils. Because prime agricultural soils are also often best suited for urban development, most of Fremont's prime soils are now developed or planned for urban development. The last remaining intensively cultivated prime soils in Fremont (with the exception of nurseries) are found in the Northern Plain area on the publicly owned Ardenwood Regional Park Preserve, and on land remaining in the original "Patterson Ranch." These lands provide a wide array of produce, examples include hay, apples, pumpkins, corn, citrus, berries, cauliflower, apricots and flowers.

Rangeland Soils. In addition to Prime Soils for cultivation, the combination of climate and soils in the Fremont hills makes this area (and much of the rest of the Diablo Range) highly productive rangeland. The Generalized Soil Map of California refers to upland hills with clay loam soils, such as the hills of Fremont, as the "best natural grazing soils in the State," assuming normal management practices and under normal conditions (e.g., average rainfall).

The hills are a patchwork of soil classification types based largely on the degree of slope. Roughly 25 percent of hill soils above the Toe of the Hill are Class IV soils, 45 percent class VI, 25 percent are class VII and 5 percent Class VIII. There are no Class V soils in Fremont. The Class VIII soils are considered unbuildable and unarable. Somewhat more of the Hill face is in Class VI through VIII classifications than of the Eastern Hill Area. Large areas in the Fremont hills are commercially grazed, including land in public ownership, which is grazed through leases with public agencies. Large parcel sizes (over 40 acres) permit efficient commercial grazing operations.

Soils and Urban Development

Just as various characteristics of soils determine their capacity to be used for standard cultivation practices, other characteristics affect their ability to be used for urban development. Some soil characteristics require the implementation of special engineering techniques to avoid failure of foundations, premature cracking and splitting of roads, severe slides and other types of problems. The soil characteristics discussed below do not include any underlying geologic conditions, which affect the ability of buildings to withstand earthquakes. Seismic/geologic conditions are discussed in the Health and Safety Chapter.

An overall assessment of Fremont's soils' suitability for urban development would mirror their suitability for agriculture. The least constrained and most readily developed soils are generally Class I and II. As the slopes on which various soil types is found becomes more severe,

the soils become more constrained for development. Steep slopes and shallow or highly erodible soils have high potential for slides and other dangers and are the most constrained and least suitable for development. In general, the steeper the slope the greater the need for significant engineering and modification of land forms to make the land suitable for safe urban development.

Soils are also rated for their ability to accept the impacts of on-site septic systems. Fremont's hill area soils, where septic systems are permitted, are not very well suited for septic systems. Many have low water holding capacity and rapid run-off, especially Class VI soils. The installation of individual septic systems requires detailed site and soil surveys to evaluate the suitability of an area to support the system without unacceptable impacts on water quality or increasing the risk of slides.

Projections

Agricultural Productivity

Some of the remaining cultivated prime soils in Fremont are in public ownership and are likely to continue to be cultivated. Those in private ownership will face increased pressure for development, especially nursery parcels and other areas currently planned for urban development.

The hills also face increased pressure for subdivision and urban development, especially east of the visible ridge. Increased division of parcels into large residential "estates" with increasingly smaller parcel areas would affect the ability of the hills to support agricultural operations.

Soils and Urban Development

As the City continues to build out, the number of potential development sites dwindles. Much of the land remaining in the City for residential development is constrained in some fashion. Many areas previously considered too constrained or expensive to develop will be proposed for development over the next few years. An increasing proportion of all development proposals are likely to be on lands that face special constraints due to slopes, geologic concerns or soil limitations.

WATER RESOURCES

Water is a complex and multifaceted natural resource. High quality drinking water is a necessary prerequisite to urban development. Uncontrolled run-off water is a threat to urban development due to erosion and flooding. Water is an important aesthetic and recreational resource in the form of bays, lakes, creeks and ponds. Finally, water supports a

variety of plant and animal habitats. Each of these qualities of water must be considered and balanced in planning for its conservation and management.

The issues related to water supply and demand for urban development are partially addressed in the Public Facilities Chapter. The impacts of urban development on water resources is addressed in this section including, for example, issues related to water quality and the impacts of urban water use on the ground and surface water supplies. The issue of flooding is addressed in the Health and Safety Chapter and flood control is described in the Public Facilities Chapter. Finally, additional data and background related to Water Resources can be found in the Water Resources Background Report.

Setting

Regulatory Environment

Due to a variety of uses and impacts, and because of its importance to development, a complex web of laws and agencies has grown over time to control and manage water resources. Agencies with significant responsibility for some aspect of water planning are briefly described below:

- **The San Francisco Bay Regional Water Quality Control Board (RWQCB)** is the agency designated by the State of California to protect water quality of all water resources in the San Francisco Bay Area.
- The **United States Army Corps of Engineers (USACE)** is a Federal agency with permit authority over any filling of a waterway or wetlands.
- The **California Department of Fish and Game (CDFG)** is a State agency with permit authority for any modification of a waterway (such as a bridge). Its primary concern is fish and wildlife habitat.
- The **Alameda County Flood Control and Water Conservation District (ACFCWCD)** is a County Agency responsible for flood control throughout Fremont. It owns and/or manages several waterways, ponds, Lake Elizabeth and flood control channels.
- The **Alameda County Water District (ACWD)** provides potable water service for the Tri-City area (Newark, Union City, Fremont). It is responsible for managing Alameda Creek water resources, the Niles Cone Aquifer and treatment of water for urban uses.

- The **San Francisco Water Department (SFWD)** controls most of the water resources of the Sunol Valley and is concerned with development of the watershed surrounding the Sunol Valley. It also provides ACWD much of the City's drinking water.
- The 27-member **San Francisco Bay Conservation and Development Commission (BCDC)** is made up of appointees from Federal, state, and local governments. The BCDC regulates new development within the first 100 feet inland from the Bay to ensure that maximum feasible public access to the Bay is provided and implements the Coastal Zone Management Act within the San Francisco Bay segment of the California Coast.
- The **Alameda Countywide Clean Water Program (ACCWP)** is a consortium of seventeen local agencies within Alameda County that share a joint National Pollutant Discharge Elimination System Permit (NPDES Permit), issued by the RWQCB.

Other agencies with some interest in water or water quality are the East Bay Regional Park District, the US Fish and Wildlife Service, the United States Environmental Protection Agency, the Bay Conservation and Development Commission, the Union Sanitary District, and the Alameda County Mosquito Abatement District.

The City of Fremont has relatively little control over the water resources within its boundaries. It controls some elements of flood control and has responsibility for management of Lake Elizabeth. It also has a significant affect on waterways and water quality through its land use plans and influences the policies and programs adopted by the above agencies.

Surface Water

Surface water includes streams, drainage channels, ponds, lakes and other water on the surface of the land. Rainfall is the source of most surface water in Fremont. Rainfall occurs during a short season in relatively intense storms. The amount of water flowing on the surface depends on how much water soaks into the ground, which in turn is dependent on the characteristics of the soil and on the amount of land made impermeable by development (roads, roofs, parking lots, etc.). These impervious surface areas, generally associated with urbanization, prevent water from infiltrating into the soil, thereby creating urban runoff, which can become polluted as it flows over urbanized areas. This untreated runoff typically enters a storm drain system and is conveyed to local waterways and eventually to the San Francisco Bay.

Streams

Before urban development began in Fremont, most streams and creeks would begin in the hills, flow onto the Bay Plain and eventually empty into the Bay or salt marshes surrounding the Bay. Except in the hills, the natural courses of waterways have been modified to control flooding and erosion. There are no rivers in Fremont.

Hill Creeks

Of the over 20 creeks draining Fremont's hills, none are naturally perennial and only a few of the larger creeks in Fremont have been named. These creeks provide much-needed water to plant life. Most are lined with thick vegetation, which tends to stabilize soils and slow erosive effects of the water. Many have high scenic value. Although dry on the surface during summer, water tends to remain in the sub-surface providing moisture for plant and animal communities.

While the water quality in Fremont's hill creeks has not been tested, there is likely to be little contamination by urban pollutants outside of developed areas; some bacteria and other pollutants from animal wastes may be found.

Fremont's water resources are shown in Figure 9-5 (next page).

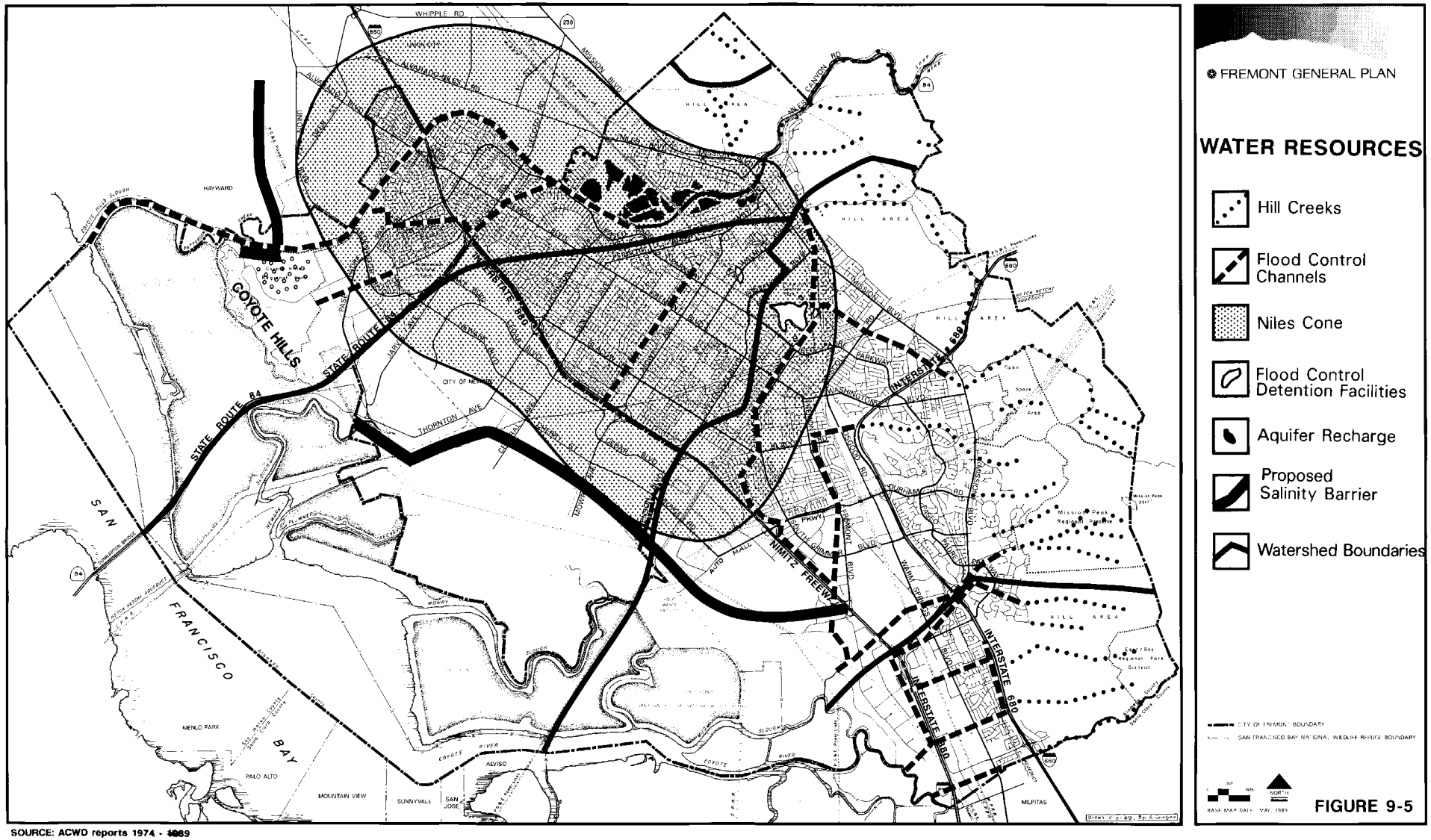


Figure 9-5 Water Resources
Chapter 9: Natural Resources

Developed Bay Plain and Hills. Within the urbanized areas of Fremont, most creeks have been channelized or put into culverts to prevent flooding. Runoff from the northern areas of Fremont drains into Alameda Creek while runoff from the central part of Fremont drains into Newark and Mowry Sloughs. Most of the southern part of the City drains into Mud Slough and Coyote Creek (Figure 9-5).

The primary purpose of the flood control system is to control the flow of water and prevent flooding. Flood control facilities are generally not designed to maximize benefits from water resource values such as aesthetic enjoyment, habitat and recreation values. Some flood control system elements, such as the Alameda Flood Control Channel and Lake Elizabeth, have been designed with recreational and aesthetic purposes in mind. Likewise, some of the creeks in the developed portions of the hill area have been left in a semi-natural state. Some open flood control channels have limited vegetation and other natural qualities.

Water quality in the streams and flood control channels of the Bay Plain has not been tested. However, typical urban pollutants (heavy metals, petroleum products, pest control chemicals) are generally picked up in rainwater flowing off streets, roofs and landscaping and flow into the City's flood control and drainage system. These pollutants are eventually deposited in the Bay. Development can also lead to disturbances in the soil that result in increased erosion and sediment in surface waters.

Alameda Creek

Alameda Creek is by far the largest and most important creek in Fremont. Alameda Creek supplies a portion of Fremont's potable water supply and is the major creek in Southern Alameda County (see Figure 9-6). Fremont is located in the westernmost part of the Alameda Creek Basin, which encompasses not only the Tri-Cities area but also Sunol Valley and the southern inland valleys south of San Ramon (the Livermore and Amador Valleys). Alameda Creek's historic drainage area is over 695 square miles. Activities that affect water quality and quantity in other parts of the basin can have a significant impact on Fremont's water supply.

Much of the water that historically flowed through Alameda Creek is now diverted to reservoirs (see Figure 9-6). Some of the water flowing through Alameda Creek when it reaches Fremont is imported from other parts of the State and released into the Creek. For example, a substantial portion of the water flowing through the creek during dry months is released from State Water Project facilities. Water is also released from Calaveras Reservoir into an Alameda Creek tributary pursuant to agreements with SFWD. The source of the SFWD water is the Sunol Valley and other parts of SFWD's Hetch Hetchy water system.

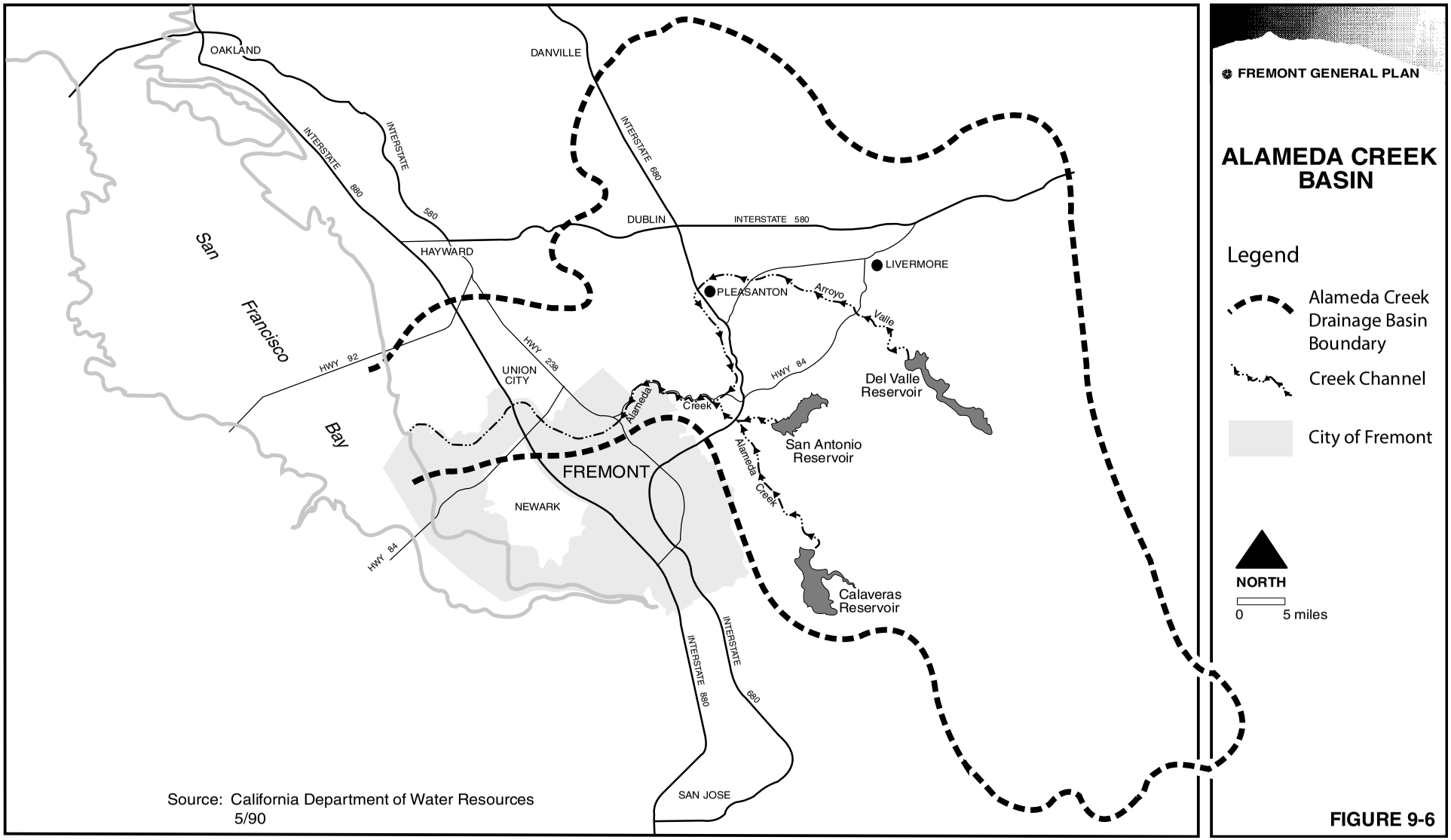


Figure 9-6 Alameda Creek Basin — Major Features

Chapter 9: Natural Resources

Once in Fremont, much of the water in Alameda Creek is diverted into the Alameda Creek Quarry ponds where it recharges the Niles Cone Aquifers (see below, under "Groundwater" for further discussion of the aquifer). Water releases from the reservoirs and State Water Project facilities have allowed for regular year-round water-flow in Alameda Creek, whereas prior to 1962 there was no surface flow for dryer months in most years.

Alameda Creek Water Quality. Water quality in Alameda Creek varies significantly by time of year, depending on the amount of rainwater flowing through the creek in relation to water discharged from reservoirs. Before 1979, the levels of several pollutants in Alameda Creek exceeded RWQCB limits in a significant number of samples. This level of pollution resulted, in part, from the high level of wastewater discharge into the tributaries of the Creek from the Livermore/Amador Valleys. After 1980, when a wastewater export pipeline to the Bay was developed from the valleys, the level of several pollutants in Alameda Creek dropped significantly. However, other activities (such as quarry discharges) have left high levels of some minerals and other elements in the Alameda Creek water.

Salt Creeks

In the western portion of Fremont there are a number of large and small salt water or tidal creeks that flow through the marshlands. The larger salt-water sloughs, including Newark Slough and Plummer Creek, appear to be former channels of Alameda Creek. The smaller salt-water creeks have little flow except from tidal action and some runoff from the urban areas. Most of the drainage from the hills to the east of the central and southern part of Fremont drains into the larger salt-water creeks such as Mowry Slough or Coyote Creek.

Ponds and Lakes

Fremont has no natural lakes. Lake Elizabeth is an artificial lake created as a recreation resource and as an element of the flood control system. Lake Elizabeth was created from "Stivers Lagoon", a natural wetlands area that formed over the unusual geologic conditions at the Hayward Fault (similar to the other ponds and wetlands areas near the BART Station). Water quality in the lake is affected by animal wastes (especially bird population). Some runoff, carrying pollutants from the urban area, also enters the lake.

Most large ponds in Fremont are also artificial. These ponds include those at the site of the Alameda Creek Quarrys, which are managed to maximize their use for recharging the groundwater basin (as discussed below, under "Groundwater"). Water quality in some of these ponds is dependent on

the water quality flowing into the ponds from Alameda Creek (see above discussion and other discussion under Groundwater).

Ponds near the Fremont BART Station were originally one ponded/ wetlands area known as Tyson's Lagoon. The area has been significantly altered and is now managed for flood control purposes. The Lagoon was at one time part of the natural wetlands area extending from Stivers Lagoon along the Hayward fault. These ponds have significant amount of wildlife habitat (see the Biology Section of this Chapter). Water quality has not been tested in these ponds, but due to the proximity of the wetlands and ponds to roads and parking lots, they are probably affected by standard run-off pollutants from urban areas.

Bay

Fremont's boundaries extend into the southern part of San Francisco Bay. Much of Fremont's run-off drains into the Bay carrying with it whatever pollutants, silt and other solids have been picked up in the City. The Bay is not only an important wildlife resource (as discussed in the Biology Section), but also a recreation resource and an industrial resource, since one of the Tri-City's major industries is salt production.

Water quality in the Bay has been tremendously altered by the diversion of freshwater and the year-round disposal of treated sewage water into the South Bay. Water quality is also affected by urban run-off, which includes a variety of toxic chemicals and heavy metals.

There are no harbors in Fremont.

Groundwater

Groundwater is that portion of the earth's water supply located beneath the surface of the ground. Fremont overlies a large subsurface basin filled with layers of sand and gravel, which store water. These water-bearing layers are called aquifers. The basin, known as the Niles Cone, extends from the base of Mission Hills in Fremont on the east to the San Francisco Peninsula on the west. It contains several discrete aquifers at varying levels beneath the surface. The Hayward fault is a barrier between the eastern and western portions of the aquifers.

Water historically percolates through the ground into the aquifers through rainfall and through creek beds (especially Alameda Creek). The water then flows underground and eventually seeps into the Bay.

The groundwater stored in the Niles Cone has historically provided much of Fremont's potable water supply. The Aquifers are used like reservoirs. Wells sunk into the aquifers collect water, which is then pumped out, treated and available for urban use.

Water Quality. The Niles Cone was historically a source of good quality water. However, water quality began to deteriorate during the early 1900s when demand for water began to exceed the amount being returned to the aquifer through natural percolation. The "overdraft" of water led to saltwater intrusion into the aquifer system.

In 1962, the Alameda County Water District embarked on a program to restore the aquifers by importing water from other parts of the State. The imported water is used to increase the amount of water being returned to the aquifer, a process known as "recharging." In a natural condition, recharge of the Niles Cone occurred primarily during the wetter parts of the year. Imported water allows for year-round recharge of the aquifers and increases the supply of water available for service. Fresh water percolating from the natural and artificial recharge is pushing back the saline water towards the Bay in some aquifers. In other aquifers the saline water cannot be pushed out into the Bay. The strategy for these aquifers is to pump out contaminated water from a series of aquifer reclamation wells.

ACWD imports water through Alameda Creek and stores it in the former gravel pits at the Alameda Creek Quarries and also installs temporary dams on Alameda Creek to increase percolation through the streambed. Because Alameda Creek and its tributaries flow through urbanized areas, water quality problems anywhere in the basin can have an impact on Fremont's water quality.

Water quality in the Niles Aquifer (outside of the areas affected by saltwater intrusion) generally reflects the quality of aqueduct water and any elements received from the ground. Water quality from the Niles Cone varies from area to area, but is typically hard and generally bicarbonate. In addition to natural salts, there is the potential for contamination by hazardous materials, especially those spilled on the ground or into Alameda Creek, or those leaking from underground tanks. There has been no identified contamination of the Niles Cone by spills or leaking tanks.

Projections

Surface Water

Streams

Hills. The future of Fremont's hill creeks and streams is closely tied to the amount of development occurring in Fremont's hills. Land adjacent to streams is an attractive location for development. Any development adjacent to creeks would have potential impacts on the creek water resulting from contaminants in run-off and siltation, as well as impacts

on the habitat areas surrounding the creek due to construction and development.

In the hills east of the Hill Face, typical urban development patterns would significantly alter the hill landscape leading to potentially significant impacts on waterways. Water quality could be affected by run-off from streets and developed areas as well as possible contamination from individual septic systems. Increased impervious surfaces would also increase the amount of run-off with potentially significant down-stream impacts from increased erosion and siltation.

Bay Plain and Developed Hills. There are only a few remaining remnants of semi-natural creeks and waterways on the Bay Plain. A few creeks have been preserved in a semi-natural state in the developed portions of the hills. Almost all flood control channels, ponds, and streambeds are managed for only one of the impacts of water: its potential to flood. The habitat and aesthetic values of water are not always a high priority in the design and development of flood control facilities.

Fremont took a leadership role in the 1960s when it encouraged the Army Corps of Engineers to design the Alameda Creek flood control channel to permit some recreational use and landscaping. In the future, the City could work with the Alameda County Flood Control and Water Conservation District to establish a program of modifying existing flood control facilities, and designing future flood control facilities to improve the recreational, aesthetic and biological characteristics of those waterways within the City.

Alameda Creek

The amount of water flowing through the Creek is protected by agreements and contracts with various agencies controlling the water in the reservoirs. Periods of drought may affect water flow.

The most serious concern for Fremont in regard to Alameda Creek is the potential degradation in water quality as a result of urban development in its watershed. The Alameda Creek drainage area includes the Livermore-Amador Valley (see Figure 9-6). Even though most of the water flowing through Alameda Creek is discharged from reservoirs or directly from the South Bay Aqueduct, pollution enters the water as runoff from urban areas.

The pipeline carrying wastewater from the Livermore/Amador Valley directly to the Bay is almost at capacity. Continued growth in the inland valleys is leading once again to review of alternative sewage disposal methods. It is important for the City to work with ACWD to monitor

decisions regarding sewage disposal for their impacts on Alameda Creek. In addition, pollution problems may increase as a result of direct discharges into the Alameda Creek system from sources such as industry, landscape watering and urban runoff. Fremont and the ACWD must monitor development proposals in the watershed to ensure appropriate mitigations are in place to capture and reduce the pollutant levels in urban runoff.

Alameda Creek may also be polluted by a traffic accident involving a vehicle carrying hazardous materials on adjacent roads, especially on bridges. This threat has been reduced on Niles Canyon Road by a State law prohibiting trucks carrying hazardous materials from using this route. There are several bridges in Fremont, which cross Alameda Creek above the recharge pits. There is also the threat of urban pollutants draining into Alameda Creek from adjacent roads and development, or from spills of toxic materials at adjacent land uses.

Most of the southern portion of the Alameda Creek watershed east of Fremont has remained agricultural. The San Francisco Water Department has restricted uses in this area to maintain water quality in their reservoirs. The City should cooperate with SFWD to protect the water quality in this watershed.

Lakes and Ponds

Lake Elizabeth and its adjacent marshes and ponds are all largely man-made, although located in a natural wetlands area. Man-made facilities tend to require careful management to avoid siltation, growth of invasive plants and algae, over-population by feral and non-native wildlife, and other problems. The Lake is also a flood control facility. As with other flood control facilities, the needs of flood control must be carefully weighed against the recreational, wildlife and open space landscape values of this lake water resource.

The ponds and wetlands near BART are also flood control facilities with significant wildlife values. Previous modifications of the ponds near BART have not fully accounted for the wildlife and landscape values of this water-resource. Future modifications of these wetlands are expected as a result of a southerly BART extension. Any new modifications could seek to retain and enhance the biological and aesthetic values of these resources.

The Alameda Creek Quarries Ponds also serve multiple purposes for groundwater recharge, wildlife habitat and open space, as well as future recreational value. Since these ponds are also man-made, they too face

serious problems with regard to siltation and degradation. While the most essential value must be the recharge of the groundwater system, this need should not lead to management solutions that discount the other important resource values associated with these ponds. The City, working jointly with the East Bay Regional Park District and Alameda County Water District, could seek to maximize all of the potential water resource values to the City.

Groundwater

The Alameda County Water District has an extensive program in place to reverse or mitigate past over-drafting of the Niles Cone. Successive years of drought, such as that occurring in the 1987 - 1990 period, could lead to temporary setbacks in achieving improvement goals, but have not had a significant impact on the plan. In future years, as new development leads to less "cushion" in the water supply, temporary over-drafts may be more common in dry years. Constant monitoring and management of the Niles Cone will be required to ensure an adequate and high-quality supply of drinking water for the City.

Direct Pollution to the Aquifers. Perhaps the most serious threat to the aquifer water supply is the potential for chemical leaks into the aquifer. While such leaks have led to contamination of other aquifers in other parts of the State, there has been no evidence of a problem in the drinking water of the Niles Cone. However, there is a limited amount of identified leaking and other discharges from underground tanks in Fremont. Leaking can be prevented, but monitoring and review of existing tanks, maintenance of leakage control procedures and careful review of proposed new tanks is required to ensure protection of the aquifer.

Bay

Fremont contributes relatively little to Bay water quality issues in the San Francisco Bay. As development continues in Fremont, it will be important to continue to address the problem of urban run-off and to seek to minimize urban pollutants entering the Bay. Of particular importance will be plans to encourage pollution prevention measures and low–impact development designs to help maintain and improve local water quality. Additionally, focus should be given to possible spillage of toxic materials in the industrial area, and especially west of I-880. Such spills have the potential to directly enter into the Bay through various creeks and sloughs if necessary protective measures are not instituted.

In 1987 Congress began to address urban runoff pollution by requiring municipal agencies to obtain National Pollutant Discharge Elimination System (NPDES) permits to manage stormwater runoff. In Alameda

County, a single NPDES permit is issued to the agencies within the county, which collaborate together as the Alameda Countywide Clean Water Program (ACCWP), a consortium of 17 member agencies including the City of Fremont. Each agency within the ACCWP is responsible for enforcing the NPDES permit requirements within its respective jurisdiction. The NPDES permit calls for member agencies to require specific stormwater pollution prevention practices, including a requirement on development projects to incorporate Best Management Practices (BMP's) during construction and to reduce long term water quality impacts by using site design, source control and stormwater treatment measures to help keep pollutants out of stormwater.

ENERGY RESOURCES

The City of Fremont produces very little energy within its boundaries. Energy is imported to Fremont in the form of electricity, natural gas and petroleum fuels from other parts of the State, nation and world. While little energy is produced in Fremont, energy is a limited natural resource. The production and use of energy causes significant environmental impacts, both in Fremont and elsewhere in the region and State. For these reasons, it is important for cities to encourage the conservation of energy resources. General Plans are required to consider opportunities for energy conservation in residential development. This issue and other strategies for conserving energy are addressed in this Chapter. Additional data and background information can be found in the Energy Background Report.

Setting

Energy is measured in terms of the work it is capable of doing. A common measure of energy is the British thermal unit or Btu. One Btu is the amount of energy required to raise the temperature of one pound of water one degree Fahrenheit.

Fremont is dependent on three major types of energy:

- **Petroleum fuels.** These are primarily gasoline and diesel fuel for vehicles, fuel oils for industry and electrical power generation, and a variety of other liquid fuels such as kerosene. Petroleum fuel is measured in gallons and contains approximately 12,400 Btu per gallon.
- **Natural gas.** Natural gas is measured in cubic feet and contains approximately 1,050 Btu per cubic foot.
- **Electricity.** Electricity is measured in kilowatt hours (Kwh), and generates 3,413 Btu per Kwh.

Supply

Assuming the citizens of Fremont consume energy in the same fashion as other Californians, approximately 90 percent of the energy consumed here would come from non-renewable sources of natural gas and petroleum. California imports about 70 percent of its energy resources. The State produces about 43 percent of its own oil supply (24 percent of total energy consumed) and 11 percent of the natural gas consumed.

Electricity is produced by hydroelectric resources, fossil fueled plants, geo-thermal resources, wind plants and nuclear plants. Pacific Gas & Electric (PG&E) is the exclusive supplier of electricity and natural gas to the citizens of Fremont.

Consumption

PG&E gathers data for the Tri-City area (Fremont, Newark, Union City). Natural gas accounts for 61 percent of the energy provided the Tri-City area by PG&E. Of the natural gas used, about half is consumed by residential customers and half by business. Of the electricity consumed, business use accounts for approximately 70 percent, and residences use about thirty percent.

Tri-City residential customers are typical of energy consumers in the State. About 47 percent of the energy used in the home is gas, and the remainder is electricity. According to PG&E, its customers use 36 percent of their energy for heating their homes, and another 18 percent for heating water.

Assuming Fremont is typical of California, 50 percent of all energy consumed is consumed for transportation. Statewide, about 75 percent of all the State's oil supplies are consumed by transportation.

Impacts

As is discussed in the Air Quality section of this Chapter, fossil fuel consumption is the primary contributor to air pollution. The consumption of fossil fuels is also the main contributor to the "greenhouse" effect, a worldwide trend toward global warming caused by the build-up of carbon dioxide in the atmosphere. The production of electricity also has impacts on the environment, including the damming of natural rivers for hydroelectric energy and several serious potential environmental impacts related to the production of nuclear energy.

Projections

Energy use in Fremont will increase proportionate to the increase in homes and businesses in the City. In addition, energy consumption for transportation will increase based on several variables, including the following.

- Locations of jobs and homes. The closer people live to their jobs, the less energy is consumed in transportation.
- Location of homes and shopping, recreational activities, schools and other land uses.
- Availability of alternative transportation modes.

The City can influence energy consumption by maintaining and applying energy efficiency standards in buildings and by encouraging energy efficient site designs and landscaping. The City's land use plans can encourage a local balance of jobs and housing and ensure the availability of shopping, recreational, childcare and other facilities near homes and jobs, thereby reducing the use of the auto. Land use plans can also cluster higher intensity uses near transit. Finally, the City can encourage the development and use of alternative transportation modes.

AIR QUALITY

Air quality affects people's health and the quality of the environment they live in. Habitual exposure to air pollutants represents an especially high health risk to sensitive people, such as the elderly and people with respiratory problems. Dirty air also affects the visual quality of the Bay Area. It can have a significant economic impact as businesses choose to locate in areas with a cleaner environment.

The quality of air is generally dependent on both local and regional activities and controls. Air resources themselves are clearly regional since air cannot be confined to the boundaries of a jurisdiction. Moreover, meteorological conditions tend to concentrate air quality problems in certain parts of the region. While one portion of the region may not exceed air quality standards, it contributes to the air quality problems of other parts of the region. For this reason, air quality is monitored and some air pollution controls are instituted and administered by a State designated regional agency, the Bay Area Air Quality Management District (BAAQMD).

Air quality is also affected by local actions and can be materially affected by land use and transportation system decisions. In the Bay Area, where automobiles are the major generator of air pollution, local decisions regarding the intensity of land use, the location of major destinations,

and the availability and convenience of alternatives to the auto can all be influenced by local government land use and transportation plans. Planning for the achievement of regional air quality standards is the joint responsibility of the Association of Bay Area Governments (ABAG), the Metropolitan Transportation Commission (MTC) and BAAQMD.

This section in the Natural Resources Chapter addresses existing air conditions in Fremont and projections about the future. It then establishes Fremont's strategy for addressing air quality issues in the future. Additional information can be found in the Air Resources Background Report.

Setting

Air quality has been a persistent environmental problem in the Bay Area. In spite of major improvements in air quality over the past twenty years, the Bay Area still experiences high air pollution levels.

Major Air Pollutants, Sources and Health Effects

While there are many different kinds of potential air pollutants, only a few are generally monitored and controlled by State and Federal air standards. The following section describes major air pollutants.

Carbon Monoxide (CO). This is an odorless, colorless gas generally formed by the incomplete combustion of fuels. CO distribution is generally related to vehicular traffic and weather (wind, etc). High CO concentrations occur when many motor vehicles are idling or at low speeds. CO therefore tends to exceed standards near congested streets and intersections. CO can result in headaches and dizziness and may aggravate cardiovascular disease.

Ozone (O3). Ozone is the primary component of "smog." It is not emitted directly but is formed in a complex photochemical reaction in the atmosphere. It involves several reactive organic compounds (ROG) and nitrogen oxides (NOx). Typically, high ozone concentrations occur during warm, windless, sunny days in summer and autumn. Sources of NOx and ROG are fuel combustion in motor vehicles and the evaporation of solvents, paints and fuels. O3 can exacerbate respiratory problems, and diminish resistance to disease. It also irritates eyes, reduces visibility and damages vegetation.

Nitrogen Dioxide. This has an important role in the formation of ozone and is the byproduct of various combustion processes in homes, motor vehicles and industry.

Particulate matter. Particulates include both solid and liquid particles suspended in the air, such as smoke, dust, aerosols and metallic oxides. The current focus of regulation is on smaller particulates (PM10). Typically, high particulate concentrations are found on winter days coupled with stable meteorological conditions and the burning of fuels (especially wood).

Sulfur dioxide (SO2) is also monitored, but is not generally a concern in the Bay Area where there is little use of high sulfur fuels. There are hundreds of other substances potentially released into the air, which can be highly injurious, even in small quantities. These include certain solvents (chlorinated hydrocarbons), metals (especially lead in gas) and asbestos. Some of the most widely found chemicals include the following:

- benzene (gas stations)
- perchloroethylene (dry cleaners)
- ethylene oxide (hospitals)

Existing Regulations and Bay Area Conditions

Air pollution regulations have been adopted by both the Federal and State Government, with the State's regulations traditionally being the more rigorous of the two. The Environmental Protection Agency (EPA) administers Federal standards, while the California Air Resources Board (CARB) administers State standards.

CARB has delegated much of its authority in the Bay Area to the Bay Area Air Quality Management District (BAAQMD). BAAQMD must provide permits for any stationary source of potential air pollution. There are 178 permits currently issued for Fremont. BAAQMD also maintain air quality monitors throughout the Bay Area, with one monitoring station located in Fremont. Table 9-1 shows current State standards and Fremont's air quality conditions in relation to those standards.

Fremont currently meets current State standards for all identified pollutants, with the exception of ozone. The particulate standards have recently been modified and there is no current information on the Bay Area's or Fremont's conformance with the new standard. Table 9-1 shows the old Federal particulate standards. Although not on the chart, other Bay Area stations have been found to exceed the State's CO standard. The Bay Area then, as a whole, is considered a non-attainment" area for air quality due to exceedences of carbon monoxide and ozone standards.

The main source of the Bay Area's problem is motor vehicles. About 80 percent of CO and roughly half of the precursors of smog come from motor vehicles. The most serious Bay Area ozone problems occur in the

Santa Clara, Livermore and Diablo Valleys where prevailing winds and meteorological conditions tend to concentrate not only local pollutants but also regional pollution. This is also true for particulates. CO, on the other hand, is typically a sub-regional problem with the most serious problems areas being northern Santa Clara County, parts of western Alameda County and southwestern Solano County.

Current State law requires non-attainment areas to prepare plans for eventual attainment of State standards, with deadlines for compliance varying between 1994 and beyond, depending on the current degree of severity.

Table 9-1
Air Pollutant Data Summary

Station: Fremont (FRMT)

Pollutant	1984	1985	1986	1987	1988
OZONE: (ppm)					
Highest 1-hr	0.15	0.15	0.14	0.16	0.13
Days > .09	19	8	3	17	7
CARBON MONOXIDE: (ppm)					
Highest 1-hr	9	10	10	10	9
Days > 20.0 ppm	0	0	0	0	0
Highest 8-hr	5.1	6.1	5.6	5	5.3
Days > 9.1 ppm	0	0	0	0	0
NITROGEN DIOXIDE: (ppm)					
Highest 1-hr	0.13	0.14	0.14	0.15	0.14
Days > .25	0	0	0	0	0
PARTICULATES:					
Highest 24-hour TSP	109	129	106	93	107
Days > 150 ug/m^3	0	0	0	0	0
Annual Geometric Mean	49.5	53.2	47.5	44.9	44.6
Annual Mean > 60 ug/m^3	No	No	No	No	No

Units- ppm: parts per million; ug/m3: microgram per cubic meter

Source: California Air Resources Board, Air Quality Data Summary, 1984-1988.

The measurements taken at Fremont's air quality measurement station are representative of the City as a whole but do not reflect potential exceedences at specific locations adjacent to pollution sources. For example, carbon monoxide can be a localized concern at congested intersections. Possible exceedences can only be measured on a case-by-case basis and require air sampling and other techniques.

A monitoring station for nine other toxic air pollutants has been operating since 1986. While information is available (see Air Quality Background Report) on current conditions, there are no Federal or State standards against which to measure existing conditions to determine if they are possible health risks.

Current Regulatory Programs

In addition to requiring permits for stationary sources, any new source of air pollutants must use best available technology to reduce pollutants. The State has also adopted a requirement for vehicle inspection to reduce tail-pipe emissions.

Air Quality and Sensitive Receptors

Certain types of land uses are particularly susceptible to air quality conditions. Among these are schools, hospitals, nursing homes, and other facilities that care for the frail or elderly. In general, receptors sensitive to air quality are also sensitive to noise. The location of sensitive receptors is shown in Figure 9-7.

Figure 9-7 Sensitive Receptors

Chapter 9: Natural Resources

Projections

Auto Emissions

Future improvements from the existing vehicle inspection program are still expected (for example, as older cars exempt from the standards are replaced). Other improvements are expected as newer cars with better pollution controls replace older cars in general. These improvements are expected to be marginal, barring some significant improvement in technology or fuels.

Perhaps the greatest improvement could be achieved through changes in travel behavior, with people living closer to work or using alternatives to the single occupant auto. The availability of sufficient housing affordable to an expected work force, and of alternative modes of transportation, will significantly affect the degree to which air pollution from autos can be reduced in the future.

Despite possible improvements, increases in the number of cars on the road, and in congestion resulting from those cars, may lead to continued exceedences of air quality standards. This is especially true in regards to carbon monoxide at highly congested intersections, sometimes referred to as “hot spots”. The air quality projections show that many major congested intersections in Fremont will be “hot spots”.

Stationary Sources

As with the auto, a slow reduction in per-industry emissions is expected with technological enhancement of pollution control devices. However, improvements in technology may be offset by increases in the total number of industries, which contribute to air pollution.

Because the Bay Area still occasionally violates State and Federal air quality standards, the BAAQMD will have to propose and implement additional ozone control strategies and estimate a new attainment date. Federal law had required compliance with Federal standards by 1987. Despite lack of compliance by many areas across the nation, EPA has not attempted to apply any sanctions. Federal sanctions could include a funding moratorium on highway construction funds.

ABAG, MTC and BAAQMD are considering various programs to bring the region into compliance with State and Federal Standards.

VISUAL RESOURCES

Fremont's visual resources are important natural resources critical to Fremont's identity as a community. Fremont's views of the Bay and the hills make it an attractive location for businesses and homes. Views of natural landmarks help to orient people in the community and provide a sense of historical continuity. Such resources require recognition and conservation just as do the other natural resources that increase Fremont's quality of life and character.

While visual resources can be both natural and man-made, this section focuses on important natural resources and the visible impacts of manmade structures and roads on them. Visual resources that are not natural resources, such as built landmarks, historic buildings and the like, are addressed in the Land Use Chapter and in the Open Space Chapter.

Setting

Fremont residents have regularly indicated their concern with the visual character of Fremont. The 1969 General Plan places significant emphasis on community appearance. The 1981 Hill Area initiative was proposed, in part, to protect the visual character of Fremont's hills.

Physical Setting: The Open Space Frame

Fremont's dominant visual characteristic is it's physical setting, defined by its open space frame: water and Baylands on the west, coastal foothills and Mission Peak on the east, and Alameda Creek and associated open space areas on the north. The frame is not continued on its southern border. The frame allows for panoramic views of open space from the City, and views of the City from the frame. The frame also provides natural gateways to the community.

Hill Face. The steep, exposed, mostly undeveloped slopes of the Hill Face are visible from most parts of the City. Hill Initiatives, passed in 1981 and 2002, provide special protection for the most visible portions of the visible Hill Face. The relatively pristine nature of the Hill Face as a whole means that even small changes provide a significant visual contrast to the remaining area. The few existing visible buildings clearly stand out on the Hill Face and affect its visual character.

Wetlands and Bay. The wetlands and Bay provide two types of vistas. First, there are the views entering the City from the Dumbarton bridge (or from trails in the Wildlife Refuge) where the undeveloped character of the Bay's edge allows for expansive vistas of Fremont, Coyote Hills and the more distant Hill Face rising from the Bay Plain. The second vista is from

the Hill Area to the Bay where the Bay and wetlands are an important visual element and provide an edge to the developed portions of the City.

Alameda Creek. The Alameda Creek flood control channel roughly marks the northern edge of the City. It is typically viewed from seven road and highway crossings, and from passenger rail routes, such as BART and Amtrak. Users of the parallel regional trail have channel/creek views with hill background views from throughout the trail length. The Ardenwood Historic Farm and the Alameda Creek Quarries area add to the sense of visual openness on Fremont's northern border.

Fremont's Unique Visual Features

In addition to Fremont's natural setting, there are unique visual resources, most within the frame itself, but others scattered within the developed areas of the City, as shown in Figure 9-8. Some of these unique natural elements have resulted from past human actions, while others are part of the original physical character of the City.

Fremont's unique visual characteristics include Mission Peak, Lake Elizabeth and Central Park, Niles Canyon, Mission Hills and Coyote Hills. Mission Peak is the dominant landform in the hills and a symbol of the City. In Central Park, the views of lake with Mission Peak in the background are some of the most valued in the City. The rural and enclosed visual character of Niles Canyon is an important visual counterpoint to the developed Bay plain. Coyote Hills, an island of hills in a low lying plain with water on two sides, is one of the outstanding natural physical characteristics of Fremont.

Landmark trees are another important aspect of Fremont's visual character. These trees are often the remnants of large historical agricultural estates such as the Patterson Ranch (now Ardenwood Historic Farm) the California Nursery (now an historic park), Hidden Valley Ranch/Stanford House, Palmdale Estate (Sisters of the Holy Family) and the Huddleson Estate (Ohlone College). In addition to these areas, the City has identified other stands of mature trees along some of the older roads in Fremont, including Mission, Washington and Fremont Boulevards.

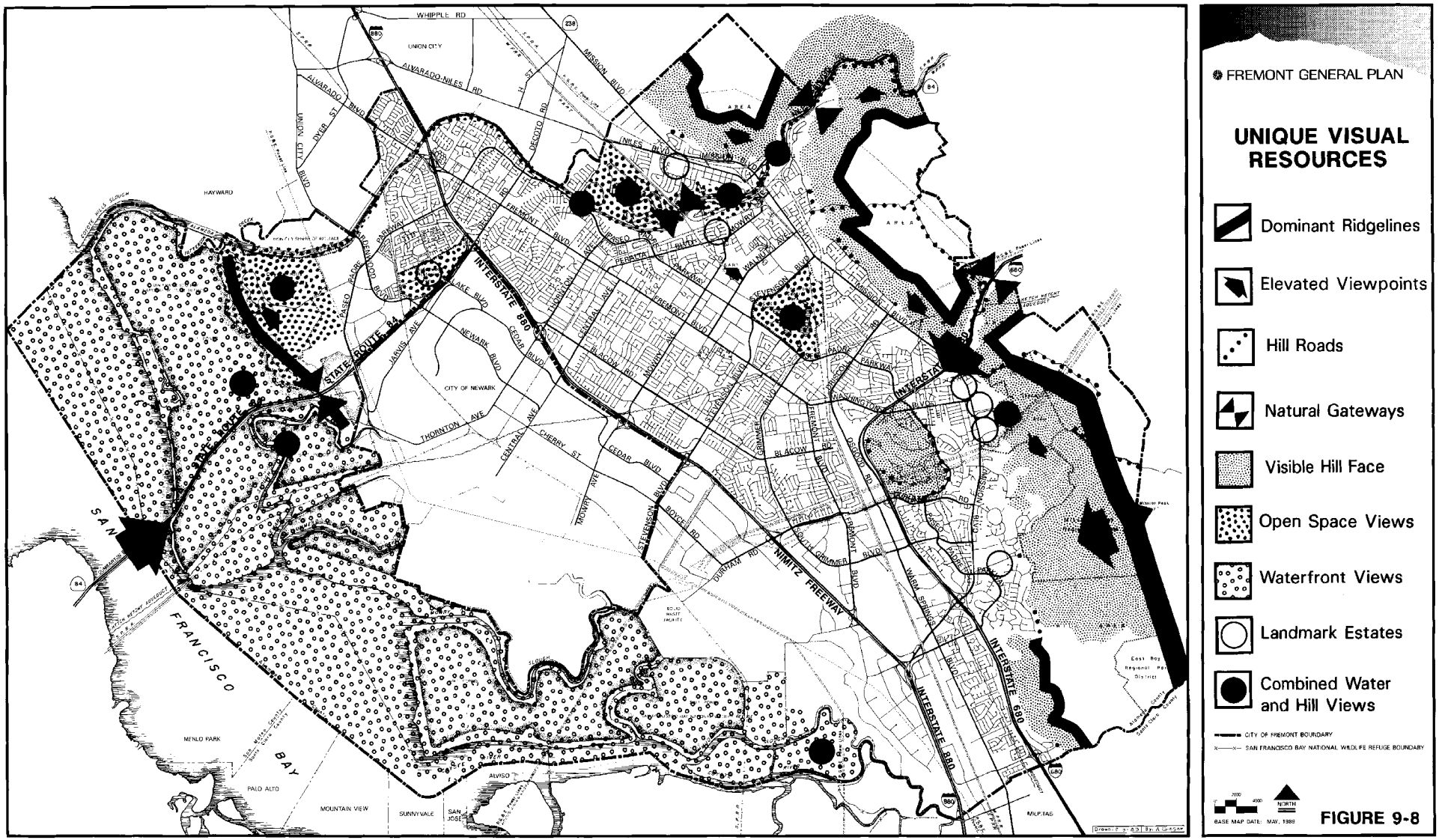


Figure 9-8 Unique Visual Resources

Fremont's Natural Gateways

The City has four natural, dramatic gateway entrances to the City: Mission Pass, Niles Canyon, the Dumbarton Bridge/Coyote Hills and Alameda Creek Quarry pond area. For residents, these natural gateways mark the boundaries of "home." For travelers, the gateways increase the sense of Fremont as a distinct community. Each of these gateways is marked by the change from rural to urban. The Niles Canyon and Mission Pass gateways are also marked by their sense of enclosure followed by an opening into an urban environment. The Mission Pass entrance has vistas of the whole south Bay area. The Dumbarton Bridge entrance to Fremont is one of the most beautiful gateways to any city in the Bay Area. The road travels through the open Bay and salt flats leading to a natural gateway in the Coyote Hills. The changing colors of the Coyote Hills and salt flats, and vistas of the Fremont hills combine to make this a unique experience. For BART riders, the Alameda Creek Quarry ponds mark the entrance to Fremont.

Fremont's Scenic Roads

Because it is not possible to conserve every view from every road, State, County and local governments designate specific routes where scenic character is considered particularly important. These roads are designated "Scenic Routes" (see Figure 9-9). Scenic routes may be thought of as the network of places from which the City is best seen. The following routes in Fremont have been designated scenic:

State Scenic Routes: I-680 and Niles Canyon

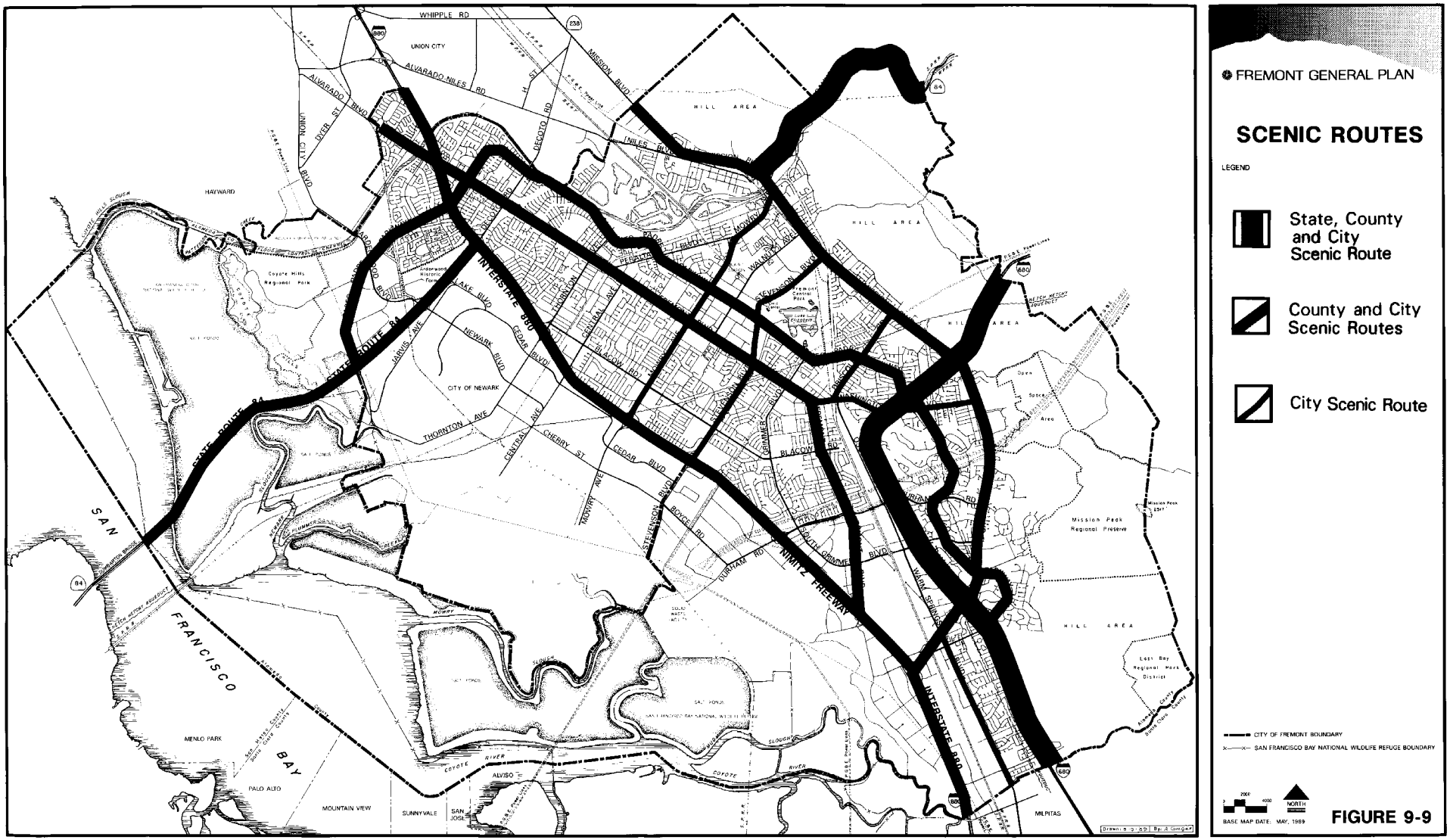
County Scenic Routes: I-880, State Route 84, Mission Boulevard and Paseo Padre Parkway (and the State routes).

City Scenic Routes: All of the above as well as the BART alignment, Fremont Boulevard, Mowry Avenue, Stevenson Boulevard, Warm Springs Boulevard and Washington Boulevard. Routes in the Hill Area are Morrison Canyon Road, Vargas Road and Mill Creek Road.

A State scenic route designation means that the view from the road should be considered in the design of the highway and in the way land uses are developed near the highway. Because local governments control land development, it is generally local government land use regulations that protect the scenic character of a State designated highway.

The County's designation is somewhat dated and generally applied to routes under the County's jurisdiction.

The City's scenic route designation was adopted in 1975 as part of the then required "Scenic Highways Element" of the General Plan. The Scenic Highways Element is no longer a required part of the General Plan, but consideration of the scenic qualities of key roads is still important and is carried forward in this section of the General Plan.



Scenic Route, Element, **Alameda County General Plan, 1966**

Figure 9-9 Scenic Routes

Chapter 9: Natural Resources

The City's designated scenic routes have generally received greater attention in design and landscaping than other roads in the City. Each of the scenic roads outside the hilly areas has a theme tree (or trees). Several have landscaped medians and relatively lush landscaping along the edges of the road. All of the City's scenic roads (outside the hilly area) provide some unimpeded visual access corridors to the hills. View corridors are defined as views constrained by some type of barrier permitting a "corridor" of vision to a visual resource. Several scenic roads are also the location of City identified Landmark Trees.

The scenic routes in the hills provide close-up visual access to wooded canyons and creeks. However, the narrowness of hill roads constrains the use of these roads for scenic purposes.

Soundwall development is having an impact on the character of some of the city's scenic roads, with walls blocking vistas and creating a tunnel with monotonous tall walls on either side of the road.

Walkway Views

Similar to roads, it is not possible or desirable to protect the views from every sidewalk and trail in the City. However, the views from some walkways are important to a particular area or, in a few instances, to the character of the City as a whole. For example, the view from the trail around Lake Elizabeth to the hills and to other elements of the park is one of the most beautiful in the City and is one of the defining characteristics of Fremont. Similarly, the view to the hills afforded from Niles Boulevard in Niles or from Mission Boulevard in Mission San Jose, in part defines the character of those commercial areas. Views from the Coyote Hills or Mission Peak trails are other examples of some of the important trail views that define the character of Fremont as it is experienced by thousands of people.

Projections

View protection is likely to become more important as the City becomes more densely developed. To properly assess impacts and allow for reasoned discussion of view issues, decision making at the administrative, review board and legislative levels will increasingly need to rely on visual simulations that are accurate, unbiased, comprehensive and that assist decision makers with a general understanding of the visual impacts of a particular project. A consistent basis for informed judgements is needed so that appropriate actions can be taken to conserve visual resources and views.

Physical Setting: the Open Space Frame

Several elements of Fremont's open space frame are publicly owned and should therefore be protected from significant change. Expansion of regional parks and the Bay Wildlife Refuge should increase the amount of land protected from development, and especially the wetlands/baylands area. Expected park improvements at the Alameda Creek Quarries should also enhance elements of the northern frame.

Portions of the Hill Face are also in public ownership, and additional areas are expected to be protected in the future. The privately owned portions of the Hill Face are protected by the Hill Area initiatives from major development. However, the initiatives permit limited development on the Hill Face. Each visible home on the Hill Face will have an impact on the visual character due to the prominence of the Hill Face and its relatively pristine nature.

Unique Visual Features

Almost all of Fremont's unique visual features are in public ownership, including Mission Peak, Lake Elizabeth and Central Park, the Alameda Creek and Quarries, Ardenwood Regional Preserve, and almost all of the Coyote Hills. A proposed golf course at the base of Mission Peak on City of Fremont land will need to be sensitive to the character of the area. Similarly, attention should be given to mitigating the visual impacts of buildings in or adjacent to Central Park. Any BART extension must be underground in order to limit its impacts on the character of the park. The quarry in the Coyote Hills will be phased out of operation in the next five years and a proposed rehabilitation plan should improve the visual character of this important entrance to the City.

Landmark Trees will be increasingly threatened by age and by development where sites are not publicly owned. For example, two of the estates in the Mission area (Hidden Valley Ranch/Stanford House and Palmdale Estate) are not publicly owned. Also potentially threatened are landmark trees along major roads where widening has been proposed.

Several of the City's natural gateways are partially in public ownership and therefore protected from development projects, which could affect their character. Future private development adjacent to natural gateways can be designed and developed to minimize impacts and enhance the character of these important gateways.

Scenic Highways

Future development along the City's designated scenic roads should consider the visual impacts of the development on the view from the road. Visual corridors should be maintained periodically along the road to visual landmarks, especially within the Central Business District and in areas where soundwalls are developed. By maintaining special landscape features, and encouraging special designs and variable setbacks for soundwalls, the view from the road can be maintained and enhanced.

View From the Walkway

Several new major trails are proposed for Fremont (see Parks and Open Space Chapter), including several regional trails. The view from these trails will become an important element of the character of Fremont as it is experienced by thousands of local and regional hikers and bicyclists through the City. As development is proposed for the commercial areas of the City, preserving corridors and views from commercial areas to the hills will become increasingly important to preserving the feeling of openness that is one of the City's hallmarks.

GOALS, OBJECTIVES, POLICIES, AND IMPLEMENTATION

Natural Resources Goals

The following section describes how the City of Fremont will conserve its resources.

GOAL NR 1: Biological resources protected and enhanced

GOAL NR 2: Protection and conservation of natural resources in the planning, design and management of the City's landscape

GOAL NR 3: Environmental education programs to encourage respect for natural areas and habitats

GOAL NR 4: Conserve mineral resources

GOAL NR 5: Conservation of productive soil resources for agricultural uses

GOAL NR 6: Urban development consistent with soil conditions to safeguard health and property

GOAL NR 7: Development sensitive to surface water resources

GOAL NR 8: High quality water

GOAL NR 9: A mix and balance of land uses which conserves energy and reduces the need for commuting and auto use

GOAL NR 10: Building and site design standards that conserve energy

GOAL NR 11: Alternatives to the single occupant auto (this goal is addressed in the Transportation Chapter)

GOAL NR 12: Air quality meeting State standards

GOAL NR 13: An open space frame to the City

GOAL NR 14: A distinctive, positive visual image for Fremont

GOAL NR 15: Visual access to scenic resources

BIOLOGICAL RESOURCES

NATURAL RESOURCES (NR) GOAL 1: BIOLOGICAL RESOURCES PROTECTED AND ENHANCED

OBJECTIVE NR 1.1: Protection of areas designated wetlands, including watercourses and riparian areas for their critical biological values including their uses as habitat for rare or endangered animals and to maintain connections between habitat units

Policy NR 1.1.1: Whenever feasible, natural and semi-natural wetlands, including riparian corridors, vernal pools and their wildlife habitat shall be preserved or impacts minimized.

Implementation 1: Development encroaching on wetland areas, including lakes, ponds, marshes, and vernal pools shall be discouraged. Within the area designated as Hill Area, development or conversion to agriculture or more intensive agriculture is not permitted on or adjacent to wetlands if the quantity or biological quality of the wetlands will be reduced measurably. "Wetlands" are areas permanently or periodically covered by water, where hydrophytic vegetation is present under normal conditions, or that have soils primarily hydric in nature.

Any development plans for areas that may affect the riparian corridor shall provide for maximum retention of natural plant formations and natural topographic features such as drainage swales and streams.

In areas designated as Hill Area, no development shall be located within a riparian corridor, except for otherwise permitted flood control, erosion control, water supply, transportation facilities, fences or hiking or equestrian trails. "Riparian corridors" are the areas within 200 feet from the center of a permanent or intermittent streambed.

Implementation 2: Riparian Corridors are roughly identified in Figure 9-3. Concurrent with the development application the extent and characteristics of riparian corridors shall be carefully assessed to a minimum distance of 100 feet from the center of the creek bed, except in the Hill Area as defined by the Hill Initiative of 2002, where the distance shall be 200 feet. Environmental assessments of these areas shall consider the full spectrum of habitat needs for flora and fauna for their

life cycle. Any development plans for areas that may affect the riparian corridor shall provide for maximum retention of natural plant formations and natural topographic features such as drainage swales and streams.

Implementation 3: Where watercourses must be modified for flood control or other purposes, the modified watercourse shall be revegetated to maximize wildlife habitat values, consistent with maintenance and safety requirements.

Implementation 4: No development or conversion to agriculture or more intensive agriculture materially impairing Critical Habitat, designated by the United States Fish and Wildlife Service for preservation of endangered or threatened plant and animal species, may be permitted.

OBJECTIVE NR 1.2: Increased interagency co-operation for the enhancement of biological resources within the city boundaries

Policy NR 1.2.1: Through inter-agency cooperation and planning, maximize the biological values of publicly owned lands, consistent with other public purposes (recreation, flood control, groundwater recharge, etc.).

Implementation 1: Work with other public agencies such as the Alameda County Flood Control District and Alameda County Water District to prepare management plans for publicly owned unique natural areas, as identified in Figure 9-3. The plans shall consider the special needs of specific plant and animal species typically found in these publicly owned lands or waterways.

Implementation 2: Encourage the Alameda County Flood Control and Water Conservation District and the County Water District to preserve, enhance, and restore the wetlands in creek and flood control channels and water recharge areas that are under their jurisdiction.

NATURAL RESOURCES (NR) GOAL 2: PROTECTION AND CONSERVATION OF NATURAL RESOURCES IN THE PLANNING, DESIGN AND MANAGEMENT OF THE CITY'S LANDSCAPE

OBJECTIVE NR 2.1: Healthy tree resources within the City

Policy NR 2.1.1: Actively monitor and protect the health of the City's tree resources.

Implementation 1: Continue to monitor City street trees for disease and impaired growth and replace as required.

Implementation 2: Enforce City Tree Protection ordinance and make information regarding the ordinance easily available.

Implementation 3: Continue to carefully review tree removal permit requests for conformance with City removal criteria (i.e. fire or safety risk, state of disease).

OBJECTIVE NR 2.2: Conservation of the City's publicly owned biological resource base, including rare or endangered species of plant or animal and habitats such as wetlands, unique biological features, trees resources, naturalized areas and grassed areas

Policy NR 2.2.1: Recognize and conserve biological values in the management and development of publicly owned natural areas.

Implementation 1: Prepare a wildlife and plant conservation plan for the City, including creeks, flood control channels, tule ponds, open space lands not managed by the East Bay Regional Park District, and other publicly owned natural areas in cooperation with other public agencies where appropriate.

Policy NR 2.2.2: Minimize impacts of development in uplands adjacent to or associated with seasonal and other wetlands (see Figure 9-2 for approximate location).

Implementation 1: As part of the environmental assessment process, identify uplands areas adjacent to wetlands species habitat and propose mitigations for potential significant environmental impacts on the wetlands from development.

Implementation 2: Projects proposed in uplands areas should minimize runoff of excess nutrients, sediments and pesticides into seasonal and other wetlands. To the degree feasible, require conservation or revegetation of uplands vegetation for nesting, foraging and retreat.

Policy NR 2.2.3: Conserve woodlands and shrubbed areas in the Hill Area, especially ridgecrests, canyons and vegetated north facing slopes.

Implementation 1: Woodlands, vegetated ridgecrests, shrubbed areas, and associated creek and canyon bottoms shall be priority areas for preservation when development is proposed.

Policy NR 2.2.4: Avoid disruption of grassed and naturalized areas known to provide groundnesting for endangered, threatened or candidate animals.

Implementation 1: Establish policies regulating weed abatement and the draining and disking of wetlands and other wildlife habitats.

NATURAL RESOURCES (NR) GOAL 3: ENVIRONMENTAL EDUCATION PROGRAMS TO ENCOURAGE RESPECT FOR NATURAL AREAS AND HABITATS

OBJECTIVE NR 3.1: Public education regarding environmental resources within the City of Fremont

Policy NR 3.1.1: Continue to promote education in biology and natural resources to aid in the understanding of the natural environment.

Implementation 1: Maintain natural science centers in City and Regional Parks, where appropriate.

Implementation 2: Work closely with other agencies such as the East Bay Regional Park District, the US Fish and Wildlife Service, the California Department of Fish and Game, and the Fremont Unified School District in developing mutually beneficial public education programs.

Implementation 3: Whenever feasible, establish agreements with other agencies for the use of lands owned by other public agencies for natural education purposes.

MINERAL RESOURCES

NATURAL RESOURCES (NR) GOAL 4: CONSERVE MINERAL RESOURCES

OBJECTIVE NR 4.1: Protect identified mineral resources from incompatible development whenever feasible and consistent with the City's long range development plans

Policy NR 4.1.1: Consider mineral resource values prior to approval of land uses in the vicinity of the mineral resource area that could affect the future availability of the resource.

Implementation 1: Identify mineral resource areas outside of developed portions of the City as Mineral Resource overlays on land use diagrams and within the City's land use database.

Implementation 2: Advise Planning Commission and City Council of mineral resource deposits for any development project proposed within approximately 100 yards of the identified resource. Evaluate impact of project on the resource during any project review or environmental assessment process.

Policy NR 4.1.2: Retain the existing open space land use designations whenever feasible on land containing identified regionally significant mineral deposits.

Implementation 1: Evaluate and consider the impacts of any proposed change in land use designation for a parcel of land containing regionally significant mineral resource identified on the Land Use diagram.

OBJECTIVE NR 4.2: Mineral resource extraction activities consistent with the character and long term health of the City

Policy NR 4.2.1: Mineral resource extraction will be permitted when it can be shown to be consistent with existing hillside and water quality protection policies of the City of Fremont.

Implementation 1: Evaluate proposals for mineral extraction to ensure consistency with existing Hill Area or water quality protection policies within this General Plan.

Implementation 2: All quarry proposals will be subject to full environmental impact assessment to evaluate impacts on adjacent uses, air quality, wildlife habitat, water supply, seasonal wetlands, scenic routes, streets, recreational open space and other relevant measures of impact.

Implementation 3: Proposals for quarrying will be evaluated in the context of the importance of the designated mineral resources to the market region as a whole and not just their importance to the City's area of jurisdiction.

Policy NR 4.2.2: Enforce requirements for rehabilitation of mineral resource extraction areas, including salt ponds and quarries.

Implementation 1: Review and enforce rehabilitation plans.

Implementation 2: Establish rehabilitation plans for salt ponds when salt production ceases.

Policy NR 4.2.3: Encourage preservation of former extraction areas (quarries and salt ponds) for wildlife and recreation purposes when feasible and appropriate.

Implementation 1: Consider conversion to wildlife habitat as part of rehabilitation plan for quarries and salt production areas.

Implementation 2: Encourage land owners of areas formerly used for mineral resource extraction to donate or lease land no longer needed for mineral extraction to an appropriate public agency for wildlife management and public recreation.

NATURAL RESOURCES (NR) GOAL 5: CONSERVATION OF PRODUCTIVE SOIL RESOURCES FOR AGRICULTURAL USES

OBJECTIVE NR 5.1: Continued agricultural or rangeland use in areas not proposed for urban development

Policy NR 5.1.1: Promote continued productive agricultural production in areas not proposed for urban development.

Implementation 1: Establish and maintain appropriate minimum parcel sizes for areas capable of supporting agriculture.

NATURAL RESOURCES (NR) GOAL 6: URBAN DEVELOPMENT CONSISTENT WITH SOIL CONDITIONS TO SAFEGUARD HEALTH AND PROPERTY

OBJECTIVE NR 6.1: Development projects designed to respond to soil conditions

Policy NR 6.1.1: No development shall be permitted on Class VIII soils as defined by the United States Soil Conservation Service.

Policy NR 6.1.2: Prior to building construction, sufficient analysis of soils shall be conducted by a qualified engineer or geologist to ensure appropriate foundation and building design.

OBJECTIVE NR 6.2: Hill Area development consistent with the special soils constraints of the Hill Area (see Land Use Chapter for definition of Hill Area, policies and implementation measures.)

OBJECTIVE NR 6.3: Minimum feasible erosion from urban development

Policy NR 6.3.1: All engineered slopes, other than those constructed in rock, shall be planted or otherwise protected from the effects of storm runoff erosion and shall be of a character so as to cause the slope to blend with the surrounding terrain and development.

Policy NR 6.3.2: Appropriate control measures shall be required to limit erosion during and immediately subsequent to new construction.

Implementation 1: Continue to enforce erosion and sediment control measures for new construction. Periodically update these measures.

NATURAL RESOURCES (NR) GOAL 7: DEVELOPMENT SENSITIVE TO SURFACE WATER RESOURCES

OBJECTIVE NR 7.1: Hill development with minimal impacts on streams

Policy NR 7.1.1: Ensure that Hill Planning Area development is planned and implemented to limit negative impacts on hill area waterways and adjacent riparian zones. See Land Use Chapter, "Hill Planning Area" for implementation measures.

OBJECTIVE NR 7.2: Maximize the biological, aesthetic and recreational benefits of natural water courses, flood control and water recharge facilities

Policy NR 7.2.1: Review proposed projects affecting natural or man-made waterways to promote their aesthetic, recreational and biological benefits, consistent with flood control and recharge objectives.

Implementation 1: Consider adopting incentives for private development, and public agencies to adopt improvements to waterways exceeding customary costs and that have clear recreational and aesthetic benefits to City residents.

Policy NR 7.2.2: Encourage water agencies (ACWD and ACFCWCD) to improve the natural characteristics of their existing water and flood control facilities.

Implementation 1: Work with ACWD and ACFCWCD to identify waterways with potential for improving biological, aesthetic and recreational character. Encourage these agencies to devote necessary resources to improving the quality of these areas.

Implementation 2: Identify State and Federal sources, and consider the use of local funding sources to upgrade the character of existing water and flood control facilities.

NATURAL RESOURCES (NR) GOAL 8: HIGH QUALITY WATER

OBJECTIVE NR 8.1 Retention of existing water quality in Alameda Creek

Policy NR 8.1.1: Discourage projects in the Alameda Creek watershed with potential negative impacts on Alameda Creek water quality.

Implementation 1: Work with the Alameda County Water District (ACWD) to evaluate proposals for wastewater disposal in the Tri-Valley area for potential impacts on Alameda Creek. Take necessary actions to discourage disposal alternatives with potential negative impacts on water quality in the Creek.

Implementation 2: Discourage development in areas under the County's jurisdiction that could affect the water quality in the Sunol Valley or its surrounding watershed lands.

Implementation 3: Continue to enforce regulations barring the transportation of hazardous materials through Niles Canyon.

OBJECTIVE NR 8.2: Water quality suitable for recreation and wildlife in Lake Elizabeth and in ponds (See Open Space and Parks and Recreation Chapters for policies and implementation measures)

Policy NR 8.2.1: Work with ACWD and EBRPD to maximize the recreational and habitat values of the Alameda Creek Quarries, consistent with recharge needs.

Implementation 1: Review development plans for the Quarries and work closely and cooperatively with EBRPD and ACWD to implement this policy.

Policy NR 8.2.2: Ensure that the extension of BART through Tyson's lagoon (wetlands between Walnut Avenue and Stevenson Boulevard) and underground through Central Park protects the habitat, scenic values, water quality and flood control capacity of the lagoon and Lake Elizabeth. Potential negative impacts on these water resources shall be fully mitigated.

Implementation 1: Evaluate development plans for the BART extension in regard to their consistency with achieving the above policy. Work with BART to identify appropriate development strategies or mitigations to implement this policy.

OBJECTIVE NR 8.3: Protection from contamination of the Niles Cone aquifer underlying Fremont (source of much of Fremont's drinking water)

Policy NR 8.3.1: Manage the storage of hazardous materials, and especially underground tanks to ensure a minimum of leakage or spills.

Implementation 1: Enforce regulations regarding handling and storage of hazardous materials.

Implementation 2: Periodically review regulations to ensure up-to-date standards.

Implementation 3: Consider the establishment of buffers between developments and recharge areas to prevent contamination of the groundwater supply from urban pollutants.

Policy NR 8.3.2: The use of reclaimed water for irrigation or other purposes should be managed so as to not have an adverse impact on the Niles Cone.

Implementation 1: Reclaimed water should either be of sufficient quality or should be used in areas of the City where it will not have a negative impact on groundwater.

Policy NR 8.3.3: Encourage the Water District to monitor water quality in the Niles Cone.

Implementation 1: Periodically consult with the Water District regarding maintenance of water quality in the Niles Cone.

Implementation 2: Continue to inform the Water District of any development proposals that could have a negative effect on groundwater.

OBJECTIVE NR 8.4: Protection of water quality

Policy NR 8.4.1: Enforce Federal, state and locally issued mandates regarding water quality such as the National Pollutant Discharge Elimination System (NPDES) permit requirements.

Implementation 1: Support the Alameda Countywide Clean Water Program and continue to implement a municipal stormwater clean water program to reduce stormwater pollutants according to NPDES permit mandates.

Implementation 2: Require development projects to incorporate stormwater treatment measures, site design techniques and source controls to prevent increases in stormwater pollutants and control discharge of stormwater runoff to local waterways.

Implementation 3: Minimize stormwater flow and volume impacts on local waterways by reducing impervious surface area and incorporating stormwater treatment controls at development sites.

Implementation 4: Preserve and where possible create or restore areas that provide important water quality benefits and areas that may be adversely impacted by increased development, such as creeks, riparian corridors, wetlands, and buffer zones.

Implementation 5: Establish additional development guidelines as needed to protect areas that are particularly susceptible to erosion or other factors that would pose significant impacts to local waterways.

Implementation 6: Encourage the consideration of pest-resistant and drought-tolerant landscaping and design features, and the incorporation of stormwater detention and retention techniques in the landscaping design of proposed development and redevelopment projects.

ENERGY RESOURCES

NATURAL RESOURCES (NR) GOAL 9: A MIX AND BALANCE OF LAND USES WHICH CONSERVES ENERGY AND REDUCES THE NEED FOR COMMUTING AND AUTO USE

OBJECTIVE NR 9.1: A significant reduction in the imbalance of jobs and housing in Fremont

Policy NR 9.1.1: Retain sufficient industrial and commercial land to provide for a significant increase in employment in Fremont.

OBJECTIVE NR 9.2: Neighborhood commercial areas convenient to homes

Policy NR 9.2.1: Designate sufficient land for neighborhood commercial centers to provide convenience goods near homes.

Implementation 1: Review the land use plan to assess the need for additional land designated for neighborhood commercial centers in underserved areas of the City.

OBJECTIVE NR 9.3: Higher intensities of housing and commercial uses accessible to transit

Policy NR 9.3.1: Focus higher intensity residential and commercial uses along streets served by transit and near BART stations.

NATURAL RESOURCES (NR) GOAL 10: BUILDING AND SITE DESIGN STANDARDS WHICH CONSERVE ENERGY

OBJECTIVE NR 10.1: A decrease in the household and employee consumption of energy through increases in energy efficiency in buildings and site design

Policy NR 10.1.1: Continue to provide public information on energy regulations for buildings and on programs for energy conservation and increasing energy efficiency.

Policy NR 10.1.2: Continue applying State standards for energy conservation in new construction.

Policy NR 10.1.3: Encourage maximum feasible energy efficiency in site design, building orientation, landscaping, and development of recreation facilities.

Implementation 1: Encourage solar heating of swimming pools.

Implementation 2: Review proposals for buildings over three stories for potential solar access impacts.

Policy NR 10.1.4: Encourage private developers to provide a choice of energy sources (i.e., natural gas and electricity) in buildings so that consumers may choose the most efficient energy source for any particular need.

NATURAL RESOURCES (NR) GOAL 11: ALTERNATIVES TO THE SINGLE OCCUPANT AUTO

(This goal is addressed in the transportation chapter.)

NATURAL RESOURCES (NR) GOAL 12: AIR QUALITY MEETING STATE STANDARDS

OBJECTIVE NR 12.1: Improved air quality

Policy NR 12.1.1: Support the BAAQMD's efforts to monitor and control air pollutants from stationary sources.

Implementation 1: Continue to require industrial projects with potential air quality impacts to obtain necessary permits from the BAAQMD.

Policy NR 12.1.2: The development of land uses considered to be sensitive to poor air quality shall be discouraged adjacent to potential air quality problems (hot spots).

Implementation 1: Sensitive receptors such as nursing homes, childcare centers, schools and health care facilities shall be discouraged from locating adjacent to major intersections projected to be congested.

Policy NR 12.1.3: Monitor and review air quality relative to State standards.

Implementation 1: Periodically review available information on the state of air quality in the City of Fremont.

Implementation 2: Review proposed projects for their potential to affect air quality conditions during the environmental impact process.

Policy NR 12.1.4: Enforce City policies and regularly review and update policies on the use, transport and storage of hazardous materials with potential for impacts on air quality and health.

Implementation 1: Review truck and train routes for the potential to affect sensitive receptors in the event of an accident involving hazardous materials. Consider conducting an outreach program to such sensitive receptors as hospitals and homes for the elderly and recommend they prepare an adequate evacuation plan.

Policy NR 12.1.5: Coordinate air quality planning efforts with other local, regional and state agencies.

Implementation 1: Review and comment upon air quality planning efforts by regional and State agencies.

Implementation 2: Review environmental impact reports of large projects in neighboring communities with the potential to affect Fremont's air quality. Request appropriate mitigations.

Policy NR 12.1.6: Reduce the air quality impacts of transportation (see the Transportation Chapter for implementation measures related to encouraging alternatives to the single occupant autos, and others).

Implementation 1: Consider phasing in the use of alternative fuels and electricity for local government vehicles to reduce air emissions. Continue to optimize maintenance of fleet vehicles to reduce air emissions.

Policy NR 12.1.7: Reduce particulate emissions.

Implementation 1: Reduce emissions from construction of roads and buildings through enforcement of construction practices that reduce dust and other particulate emissions.

Policy NR 12.1.8: Reduce emissions through energy conservation.

Implementation 1: Encourage energy conservation features in new development (see Energy section of this Chapter for specific measures).

VISUAL RESOURCES

NATURAL RESOURCES (NR) GOAL 13: A DISTINCTIVE, POSITIVE VISUAL IMAGE FOR FREMONT

OBJECTIVE NR 13.1: Preservation of the visual character of the City's Open Space frame and other unique natural visual elements of Fremont. The Frame includes the Hill Face, Bay lands, Alameda Creek flood control channel and adjacent publicly owned open space areas (Ardenwood Regional Park, Alameda Creek Quarries). Other unique natural elements include Central Park and Lake Elizabeth and Landmark Trees. (See the Land Use and Open Space Chapters for many policies and implementation measures related to the Open Space Frame)

Policy NR 13.1.1: Seek permanent protection of unique visual elements within the City. Minimize any negative development impacts on the visual characteristics of the resource when permanent protection is not feasible.

Implementation 1: Prepare and adopt guidelines for visual impact assessments. Conduct a visual impact assessment of any proposed public or private project on an identified visual resource. Mitigate negative visual impacts to the degree feasible.

Implementation 2: Beyond restrictions elsewhere in this Plan, consider adopting further standards for structures and landscaping on the Hill Face, to minimize contrast and reduce visual impacts.

Policy NR 13.1.2: Maximize retention of Landmark Trees on public and privately owned lands (see Landmark Trees).

Implementation 1: Continue to apply the City's tree preservation and landmark tree ordinance (for definition, discussion and list of existing trees, see the 1973 report "Landmark Trees of the City of Fremont" available at the Community Development Department).

Implementation 2: Use transfer of development rights, site design strategies, and the density bonus provisions of this General Plan to conserve Landmark trees whenever feasible.

OBJECTIVE NR 13.2: Conservation and enhancement of natural gateways. Natural gateways are defined as: Mission Pass, Niles Canyon and State Route 84 through Coyote Hills

Policy NR 13.2.1: Protect the natural gateways of the City through project review and encouragement of appropriate design.

Implementation 1: The visual impacts of projects adjacent to or that affect the visual character of defined gateway areas shall be assessed prior to approval. Sensitive areas are considered to be the land on either side of I-680 east of Mission Boulevard, land on either side of SR 84 within a half mile east of the toll plaza, and land on either side of SR 84 east of Mission Boulevard.

Implementation 2: For developments within defined sensitive areas, the City shall strongly encourage a positive visual image that enhances the gateway character of these areas. Structures that intrude upon the natural character of Gateway areas shall be avoided.

Implementation 3: Review proposed projects on land under the County's jurisdiction in sensitive areas for visual impacts. Seek mitigation of any visual impacts, especially in the State designated scenic route in Niles Canyon.

OBJECTIVE NR 13.3: A high quality visual environment

Policy NR 13.3.1: Reduce the visual impacts of signs, utility lines and poles.

Implementation 1: Maintain standards for signs to reduce their impact on the natural scenic character of the City and retain a strong, positive visual image for Fremont.

Implementation 2: Continue to promote undergrounding of utilities, and require undergrounding of utilities in new development.

NATURAL RESOURCES (NR) GOAL 14: VISUAL ACCESS TO SCENIC RESOURCES

OBJECTIVE NR 14.1: Visual access to scenic resources from designated scenic routes

Policy NR 14.1.1: The following routes are designated scenic routes for the City of Fremont: I-680, State Route 84 through Niles Canyon, State Route 84 from the western City limits to I-880, Mission Boulevard, Paseo Padre Parkway, Fremont Boulevard, Mowry Avenue, Stevenson Boulevard, Warm Springs Boulevard and Washington Boulevard. The BART alignment is also considered a scenic route (see Figure 9-9).

Policy NR 14.1.2: The impacts of development on the scenic character of scenic routes and on the routes visual access to scenic resources shall be considered prior to approval of industrial and commercial projects adjacent to scenic routes.

Implementation 1: Visual impact assessments shall be conducted for projects over two stories high adjacent to a scenic route. Guidelines for scenic impact assessment shall be prepared.

Implementation 2: Proposed uses that could have a negative impact on the quality of the visual character of an area adjacent to a scenic route shall be required to screen or in other ways limit the visual impacts of the use.

Policy NR 14.1.3: The impacts of soundwall development on the scenic character of scenic routes and on visual access to scenic resources shall be considered prior to approval of soundwalls along scenic routes.

Implementation 1: Guidelines for the assessment of the visual impacts of soundwalls shall be prepared.

Policy NR 14.1.4: Maintain adequate landscaping for scenic roads to enhance their scenic character.

Implementation 1: For designated scenic routes, maintain theme trees as defined by the 1975 “Scenic Highways Element”, as amended, and included as Appendix II of this plan. Replace trees as necessary.

Policy NR 14.1.5: Evaluate and consider the impacts of any significant roadway modification (including any grade separations) on the scenic character of scenic routes and on visual access to scenic resources.

Implementation 1: Proposed significant modifications in roadway width or in character shall be considered during the environmental assessment process.

OBJECTIVE NR 14.2 Visual access to scenic resources from community commercial areas

Policy NR 14.2.1: Consider the impacts of development in community commercial centers on visual access to visual resources as part of public planning processes.

Implementation 1: Specific plans, design and development plans for Community Commercial (CC) Areas shall consider the establishment of visual corridors from public sidewalks and plazas to natural visual resources (and especially the hills). These plans shall also consider establishing appropriate building heights and design guidelines to conserve visual access to these resources.

Implementation 2: While plans are prepared, the visual impacts of buildings over two stories in CC areas shall be evaluated prior to approval.

OBJECTIVE NR 14.3: Visual access to scenic resources from the Central Business District

Policy NR 14.3.1: Consider the need for visual corridors in the preparation of design and development plans for the CBD (see Land Use Chapter for implementation measures).